PIT & QUARRY

NOVEMBER 1980

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AND NEXT MONTH

Inventive producer solves baghouse problem
An answer for fast car unloading

ON THIS MONTH'S COVER

Three overlapping zones of chemical-grade limestone are being worked at Luttrell Mining Co. Inc.'s site at Luttrell, Tenn. New underground mine has been added to surface operations. See page 54.

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Society for Testing and Materials.

The symposia will concern itself with the effect on product quality by the use of various waste products such as fuels, raw materials, or additives. Energy conservation brought about by chemical alterations, equipment, and grinding techniques also will be a subject of consideration.

Prospective authors are asked to contact: Jack Mander, Chairman CO1.93, Universal Atlas Cement, P.O. Box 29, Northhampton, Pa. 18067. Abstracts and ASTM paper offer forms are due by April 15, 1981. Offer forms are available from the ASTM Publication Div., ASTM, 1916 Race St., Philadelphia, Pa. 19103. All papers submitted, whether delivered during the symposia or not, will be considered for a special technical publication on the proceedings by ASTM. Presentation times for talks should not exceed 20 minutes.

Lone Star Expects Good Year Despite Construction Slump

Lone Star Industries, Inc., Greenwich, Conn., recently told New York investment analysts that 1980 is a year of positioning for the company and that it expects its net income from continuing operations to approximate 1979's record results, despite the severe decline in construction activity this year.

Lone Star president and chief operating officer, Donald M. Halsted Jr., said that for the full year the company does not expect to record any significant earnings gain or decline from last year's record $5.15 per share. "The fourth quarter will tell the story," he said.

While final results for the three and nine months periods which ended September 30 are not yet available, "the third quarter will fall short of the exceptional third quarter of 1979," which at $2.28 per share was by far the most profitable quarter in the company's history. "Nevertheless," Halsted added, "our profits for the nine months are expected to surpass last year's $3.60 per share from continuing operations."

Because of the seasonal nature of the industry Halsted does not expect the next several months to produce any significant trends. "Our judgement, however, is that we now are seeing the worst of this recession, and that the construction season of 1981 will show some real recovery."

Dravo Lime Publishes Lime Technology Brochure

The use of lime technology to solve challenging problems in the mining, utility, agricultural, and steelmaking industries is described in a new brochure available from Dravo Lime Co. The booklet (80DL01) illustrates the importance of capabilities beyond the product and describes how Dravo's extensive research and technical services can serve consumers of lime products.

The 12-page brochure outlines Dravo Lime's manufacturing, materials handling, and technical capabilities. Services connected with the design, construction, and start-up of lime producing and processing facilities also are included.

For more information write: Dravo Lime Co., 650 Smithfield St., Pittsburgh, Pa. 15222.

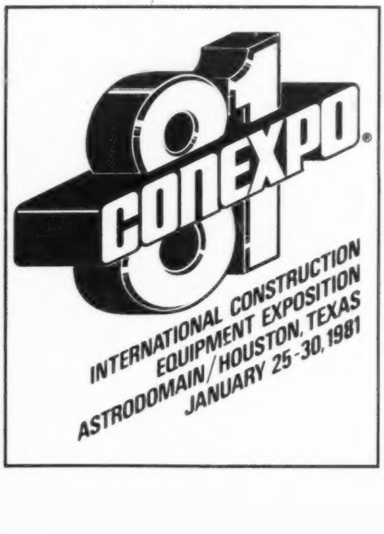
Material Service Acquires Southern Illinois Property

Material Service Corp., Chicago, has acquired the Hulcher Quarry in Nokomis, Ill., southeast of Springfield. The property, which also encompasses a mineral filler plant, will be known as the Material Service Hulcher Quarry.

Jack Brown from Material Service's Indian Point plant at Indian Point, Ill., temporarily is coordinating activities at Hulcher. Personnel at Hulcher will continue to service the quarry for Material Service.

CIMA Reports Exports Exceed $2.75 Billion

American manufacturers exported construction machines and related components valued at more than $2.75 billion during the first six months of 1980—$500.7 million more than was exported during the same period last year, according to the mid-year 1980 *U.S. Exports of Construction Machinery* publication. The publication is produced by the U.S. Department of Commerce and the Construction Industry Manufacturers Association.



COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1980 August	1979 August	% Change
Nonresidential Building	$ 4,313.4	$ 4,409.3	− 2
Residential Building	5,896.6	7,075.1	−17
Nonbuilding Construction	4,935.7	2,811.4	+76
Total Construction	$15,145.7	$14,295.8	+ 5

	1980 8 mos.	1979 8 mos.	% Change
Nonresidential Building	$33,681.3	$ 33,731.6	**
Residential Building	38,588.3	52,647.1	−27
Nonbuilding Construction	22,348.4	32,572.6	−31
Total Construction	$94,618.0	$118,951.3	−20

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**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

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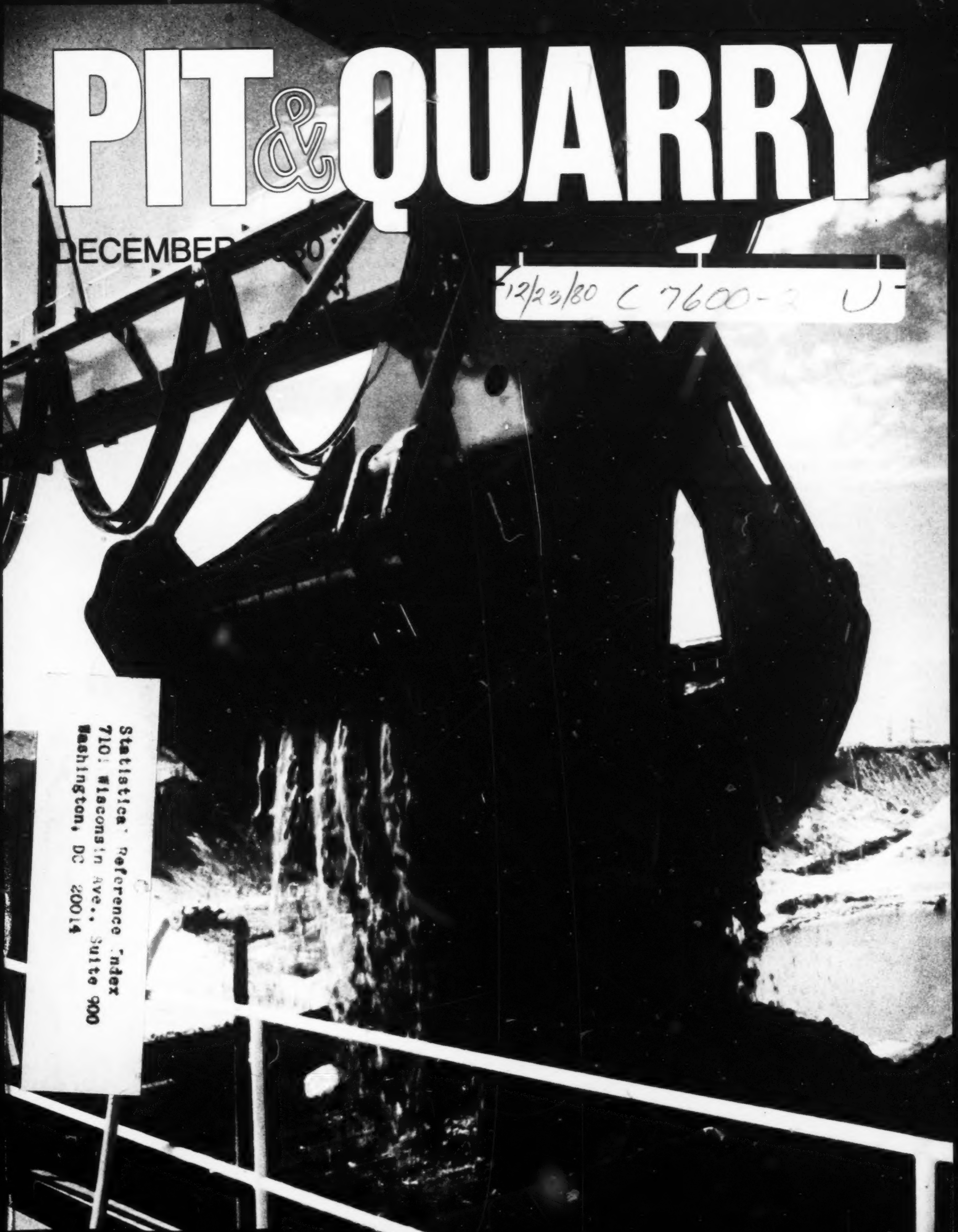

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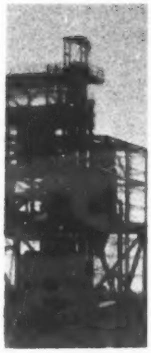
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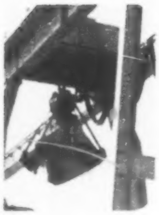
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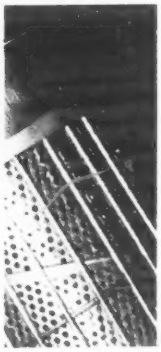
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Annual review and outlook reports on aggregates, cement and major nonmetallics industries
Refractory material produced on former cement plant site

ON THIS MONTH'S COVER

Paceco-Mohr Twin Bucket dredge is rated for a production capacity of 1,000 tph at Building Product & Concrete Supply sand and gravel pit in Winnipeg, Manitoba (Canada)

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The agreement is subject to the consent of shareholders and to certain necessary regulatory consents. Financing of the transaction has been arranged, and is subject to the execution of final documents satisfactory to the lenders.

W. W. Henderson Named President of AMCA

W. W. Henderson, vice president-sales, Robinson Industries, Inc., Zelienople, Pa., has been elected president of the Air Movement and Control Association for 1981 at the association's 25th annual meeting held recently in Scottsdale, Ariz.

W. W. Henderson

Other AMCA officers elected are: board chairman, Emery B. Jones, American Coolair Corp.; vice president, John A. Nine, Clarage Fan Co., Div. of Zurn Industries; secretary-treasurer, Alan J. Meilinger, Sturtevant Div., Westinghouse Electric Corp.

Elected to the AMCA board of directors are: Charles Barry, Twin City Fan & Blower Co.; Richard E. Hauck, Buffalo Forge Co.; Richard J. McKnight, American Warming and Ventilating, Inc.; and Roy Neal, Air-Care Inc.

AMCA is the international trade association of manufacturers of fans, louvers, and dampers, used in industrial and commercial installations.

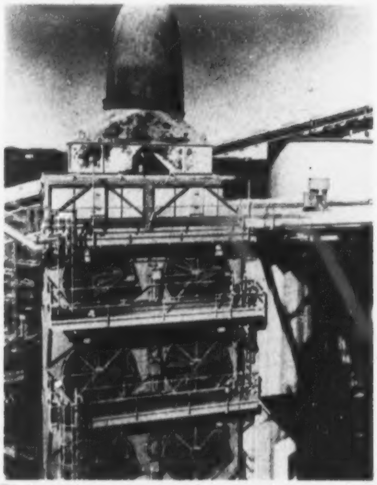
Sii Mining Equipment Companies Formed, Wilson Named President

Smith International, Newport Beach, Calif., has formed Sii Mining Equipment Companies, according to Dr. John W. Wilson, recently appointed president of the new unit. The Houston-based group will consolidate all the firm's mining equipment operations, including the existing Sii Drilco Industrial and Sii Mining Tools Div., Sii Smith-Gruner (formerly part of Sii Smith Tool), Smith-Boart of South Africa and all other international mining units.

J. W. Wilson

According to Wilson, the new structure will provide a stronger, more unified approach to market planning and to research and development for the existing divisions, as well as to target new growth opportunities in the mining industry.

Wilson joined the company earlier this year as director, mining technology. Wilson has more than 25 years of technical and management experience in the mining industry and holds masters and doctorate degrees in mining engineering. He is the author of numerous technical papers presented over the last 10 years.


• A unique gas cooling exchanger has been installed in the new Knoxville, Tenn., plant of Ideal Cement Co. Developed by Smith Environmental and Engineering, Duarte, Calif., the exchanger is designed to cool the temperature upsurges in the exhaust gases from the clinker cooler prior to entering the baghouses, eliminating the danger of fires in the baghouse. Use of the exchanger in the system also reduces capital expenditures since smaller baghouses may be used because of the smaller volume of air. The exchanger gases are cooled by drawing them through steel tubes over which ambient air is drawn by three 20-hp fans. These fans do not operate when the temperature of the gases are normal in the 150°F. range. However, when the temperature upsurges the fans are activated automatically. The first bank of fans is activated at 250°F., the second at 270°F.

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1980 September	1979 September	% Change
Nonresidential Building	$ 4,419.4	$ 4,474.7	− 1
Residential Building	6,068.8	6,184.4	− 2
Nonbuilding Construction	2,589.0	2,504.6	+ 3
Total Construction	$ 13,077.2	$ 13,163.7	− 1

	1980 9 mos.	1979 9 mos.	% Change
Nonresidential Building	$ 38,102.1	$ 38,203.2	**
Residential Building	44,649.3	58,837.2	−24
Nonbuilding Construction	24,889.4	35,079.8	−29
Total Construction	$107,640.8	$132,120.2	−19

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(1972 = 100, seasonally adjusted)

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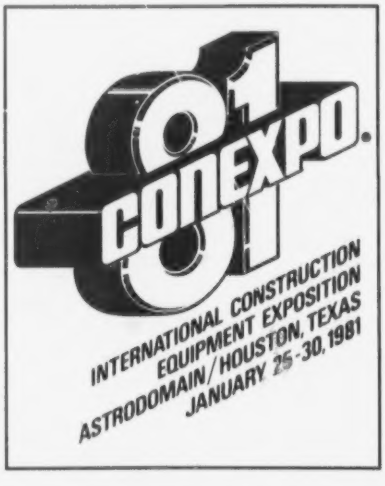
**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*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AND NEXT MONTH

"Focus" features on pollution control measures

ON THIS MONTH'S COVER

Cementos Catatumbo, onstream in Venezuela in mid-1980, features an 1,800-mtpd reinforced suspension preheater kiln equipped with a precalciner. (See page 94.)

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1981 outlook
1980 review

CEMENT

aggregates

Lime

Pit and quarry industries—

Brakes expected in 1981 on 1980 slide

BY SANDY HEROD

Depending on the scale on which charts of economic factors covering the past year could be drawn, up-and-down trends could look like the Alps or reflect a more moderate program of upturns and downswings. The net effect would be the same. Over the course of the year, these industries, basic to the nation's physical growth, collectively experienced a decline variously estimated between 8 and 12%.

This, despite the fact that respondents to our latest annual surveys report, on average, lesser rates of decrease. It also is interesting to note that optimism for 1981 is even more prevalent than it was a year ago.

Information is sought from a variety of sources to develop this annual Outlook and Review. In addition to personal contacts by our staff with a large segment of the portland cement industry, several thousand firms in the aggregate industries are canvassed by questionnaire. The data are complemented by commentaries solicited from staff leaders of national, regional, and state associations.

The initial section of this report presents comments submitted by staff heads of major national industry groups with interests common to those of the majority of our readers.

Their comments are followed, in the next two sections, with reviews by our staff of factors in the construction field and of current conditions, along with long-range plans, in the domestic portland cement industry. (An international cement review is presented elsewhere in this issue. See pg. 109)

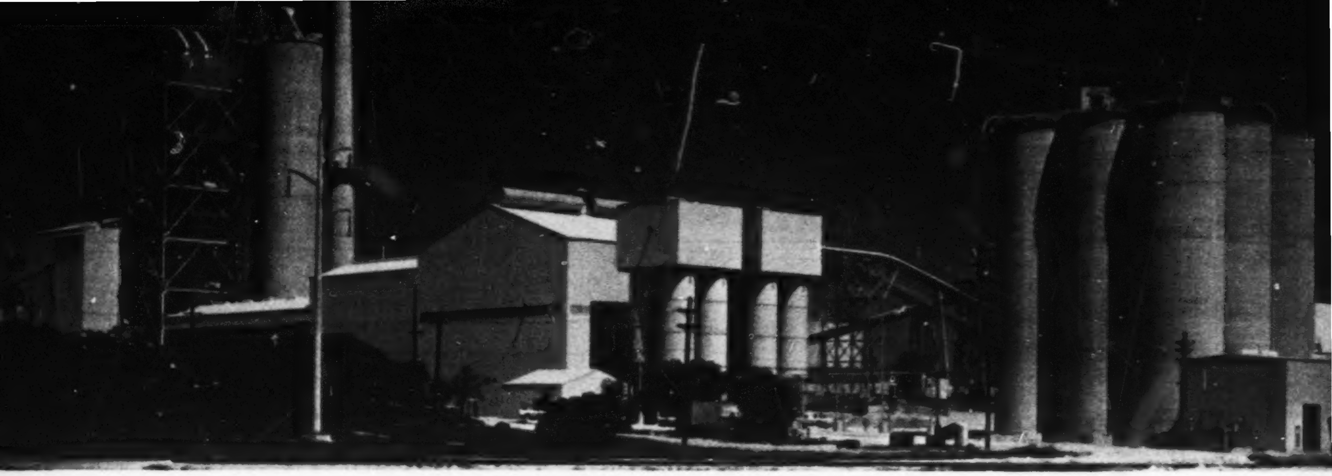
The fourth section incorporates observations by several state and regional association staff leaders which review conditions in the aggregates industries in specific geographic areas.

In the final section of this report, we present the conclusions and analyses drawn from our questionnaire survey of several thousand producers in three major aggregate industries. This is followed by summaries of the latest government and private industry data available on major nonmetallic commodities including lime, agricultural limestone, gypsum, phosphate, potash, and others.

The cooperation of the well-known leaders of national and state industry organizations who again have been responsive to our request for their participation is sincerely appreciated.

At the national level, we are indebted to Richard E. Reuss, president, Portland Cement Association; William L. Carter, president, National Crushed Stone Association; Robert Koch, president, National Limestone Institute, Inc.; Howard Eggleston, managing director, National Slag Association; T. R. Berger, executive director, Lightweight Aggregate Producers Association; Harry C. Robinson, managing director, Expanded Shale Clay and Slate Institute; Kenneth Gutschick, vice president and technical director, National Lime Association; and A. Victor Abnee Jr., executive vice president, Gypsum Association.

The following state association staff leaders furnished commentaries on industry conditions in their specific areas: J. R. Hitchcock, executive director (ret), Georgia Crushed Stone Association; R. E. Eichelberger, executive secretary, Nebraska Sand, Gravel & Ready Mixed Concrete Association; George Dirkes, executive director, Illinois Association of Aggregate Producers; N. A. McDonald, executive manager, Missouri Limestone Producers Association; Don Reining, executive secretary, Southern California Rock Products Association; and Jack Cedarblade, executive secretary, Aggregates and Concrete Association of Northern California, Inc.



. . . New 550,000 tpy dry process plant placed onstream in 1980 by Texas Industries at Hunter, Texas uses a Polysius preheater/precalciner kiln arrangement. *(Courtesy: Polysius Corp.)*

Portland cement Production and project survey

BY SID LEVINE

Cement use in the United States will grow to an average of 85 million short tons per year in the next 5 years, compared with an annual consumption of 78 million tons in the 1970s, according to recent forecasts by the Portland Cement Association. To attain this goal, however, a sharp rise in shipments would be needed starting in 1983. In its October 1980 forecast, PCA's estimates of cement consumption were 73.4 million tons in 1980 and 76.4 million tons for 1981, compared to 83.3 million tons in 1979.

The projection is based primarily on estimates of housing activity. In the forecast on U.S. cement consumption, PCA economist Robert Roy points out that cement consumption is affected both directly by residential construction and indirectly by housing's effect on other cement-using construction markets. For this reason, Roy notes, an excellent model of cement demand can be constructed with home building as the leading variable. In addition, he said, long-term projections of housing activity are available from several economic forecasters.

Cement production

During 1979, 83.4 million tons of portland cement were shipped from plants in the United States and Puerto Rico, according to the U.S. Bureau of Mines. Shipments were slightly higher than in 1978 and 4% less than the 1973 record levels of 86.6 million tons. Mill value rose to $3.9 billion, 13% higher than in 1978; this increase reflects an average unit price hike of $5.53 per ton.

At 1979 year-end, 377 kilns at 157 plants were operated by 50 companies and one state agency in 40 states and Puerto Rico. Ten producers provided 46% of the total clinker production capacity; in descending order, they are: Ideal Basic Industries, Inc.; Lone Star Industries, Inc.; Martin Marietta Cement; General Portland, Inc.; Kaiser Cement Corp.; Amcord, Inc.; National Gypsum Co.; Marquette Cement Co.; Medusa Cement Co.; and Southwestern Portland Cement Co.

In a slightly different descending order, nine of the 10, plus one other, produced 45% of the finished cement ground in this country. The companies are: Lone Star Industries, Inc.; Ideal Basic Industries, Inc.; Martin Marietta Cement; General Portland, Inc.; Amcord, Inc.; Kaiser Cement Corp.; Medusa Cement Co.; National Gypsum Co.; Marquette Co.; California Portland Cement Co.

Portland cement shipments in 1979, by type of customer, were: ready-mixed concrete, 65.9%; concrete product manufacturers, 14.1%; building material dealers, 8.9%; highway contractors, 4.5%; other contractors, 4.7%; federal, state, and other government agencies, .7%; miscellaneous, including own use, 1.2%.

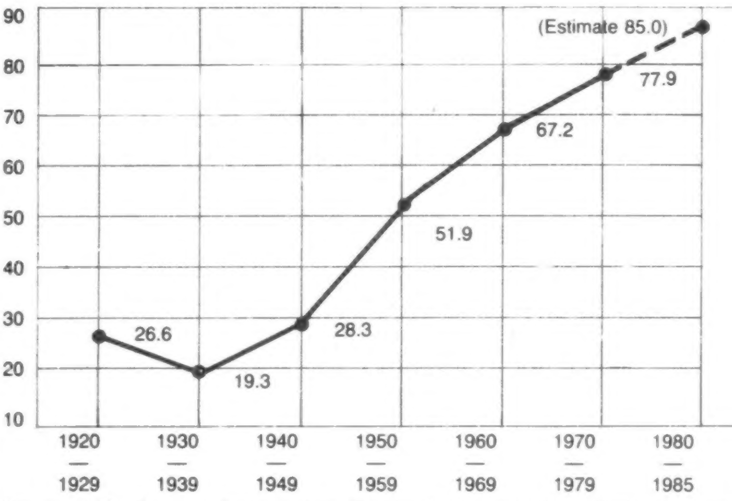
Shipments of masonry cement were 3.8 million tons, a decrease of 9% from 1978. The top five masonry producers in descending order were: Louisville Cement Co.; Martin Marietta Cement; General Portland, Inc.; Marquette Co.; and Medusa Cement Co. These companies produced 44% of the nation's total.

Imports

Imports of cement and cement clinker for consumption in the United States reached a record 9.4 million short tons in 1979, 42% above the 1978 total of 6.6 million tons and 40% above the 1973 record of 6.7 million tons. The imports constituted 11.3% of the year's finished cement shipments. Most of the supplying countries increased their exports to the United States possibly because of a drop-off in cement use abroad. Preliminary data indicate

FIG. 1

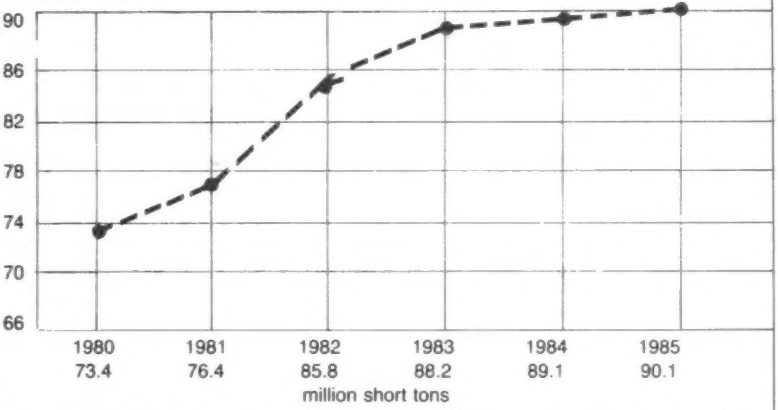
U.S. Cement Consumption—annual average tonnage for 10-year periods (1920-1979) and estimate for 1980-1985
million short tons



Source: "U.S. Cement Consumption Forecast," August 1980, Portland Cement Association

FIG. 2

Cement Consumption Forecasts, 1980-1985 (average values, based on housing forecasts)
million short tons



Source: "U.S. Cement Consumption Forecast," August 1980, Portland Cement Association (does not include Puerto Rico).

that imports into the United States may drop 50% in 1980 over 1979.

Major supplying countries were Canada, Japan, Mexico, the Bahamas, the United Kingdom, France, Spain, Norway, and Peru. For the 1973-77 period, imports were made up of the following groups: Roman (natural), portland and other hydraulic cement, 64.1%; hydraulic cement clinker, 35.3%; white nonstaining portland cement, .6%.

As usual, U.S. cement exports were quite small, amounting to 160,000 short tons in 1979. Shipments were made to nearby locations—Canada, Mexico, and the Caribbean.

To meet anticipated demand for imported cement and cement clinker in the Pacific Southwest and the Sun Belt, two new bulk cement receiving and storage terminals are expected to be operational by the end of 1981. A $17 million, 50,000-ton capacity terminal is slated for operation in California's Long Beach Harbor by mid-year.

The terminal will be operated by the Pacific Coast Cement Corp., a joint project of Philipp Brothers, a division of Engelhard Minerals & Chemicals Corp.; Northsouth Export Corp., an affiliate of Exportadora Espanola de Cementos Portland; and Lawrence J. Ramer, Pacific's chairman of the board, and John W. Sweetland, the company's president.

The facility will consist of six 165-ft.-high silos equipped with dust collection equipment. Cement brought in by ships will be unloaded with a mechanical bulk unloader made by Siwertell, A.B. of Sweden. Conveyors and a vertical lift elevator will discharge the cement into the silos.

The two-acre facility will be located on Pier D, Berth 32. Peter Kiewit Sons' Co. was awarded the contract for project construction. Cement will be distributed by 25-ton tank trailers to markets in California, Nevada, and western Arizona.

A bulk cement loading and storage facility, estimated to cost $15 million, is planned for Galveston, Tex. at Pelican Island. Texas Portland Cement Co., a subsidiary of Philipp Brothers, and Marquette Cement Co., subsidiary of Gulf & Western Industries, Inc., will operate the terminal. Cement will be brought to Galveston in barges and ships for shipment inland or for transshipment to foreign customers.

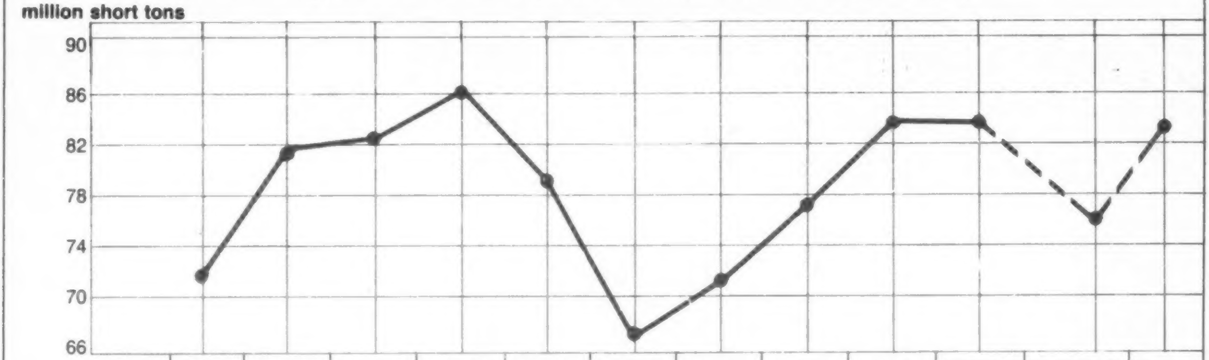
Values and prices

The value of finished portland cement shipments totaled $3.86 billion in 1979, compared with $3.41 billion in 1978. Although domestic cement consumption is expected to show a drop of 8-10% in 1980, the value may rise about 5%, to $4.1 billion, because of price increases. Average values for a ton of portland cement have risen from $31.09 in 1975 to $46.24 in 1979. Prices for November 1980, as reported in *Engineering News-Record*, ranged from $48.31 a ton in Philadelphia to $71 in San Francisco.

The value of masonry cement in 1979 amounted to $205.43 million; average value was $54.59 per short ton. October 1980 prices of cement mortar (in 70-lb. bags), as noted in *Engineering News-Record*, ranged from $2.36 in Philadelphia to $4.95 in New York.

FIG. 3 **Portland (Finished) Cement—Shipments from Mills in the United States***

(Shipments from mills (plants) = cement ground from clinker manufactured in kilns in the U.S. and Puerto Rico + cement ground from imported clinker + cement imported and distributed by domestic producers only)

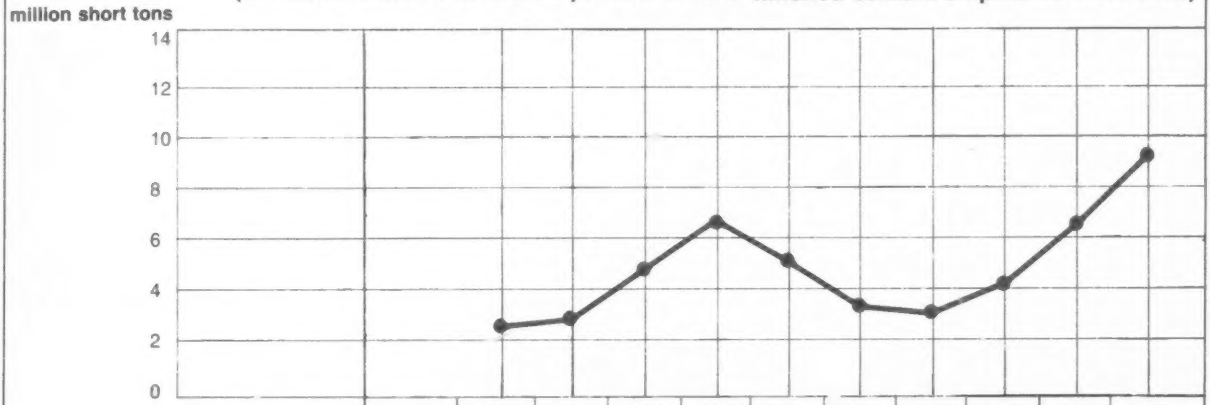


	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	73.407	79.005	81.432	86.597	79.482	67.776	71.922	77.852	83.849	83.390	est. 76.5	83.4
Clinker production in the U.S. (mst)	73.990	75.231	77.378	78.212	77.978	64.539	68.579	71.987	75.455	76.143		
Masonry cement shipped by U.S. producers* (mst)	2.978	3.392	3.850	4.130	3.432	2.908	3.304	3.764	4.102	3.833		
Stocks at mills, as of Dec. 31 (mst)	7.228	6.114	6.709	5.230	7.156	6.575	6.790	5.709	5.012	6.216	Portland cement	
	N.A.	N.A.	N.A.	.327	.354	.398	.395	.365	.339	.421	Masonry cement	

**Includes Puerto Rico. Cement shipments from Puerto Rico amounted to 1.442 million short tons in 1978 and 1.406 million short tons in 1979.*

Sources: U.S. Bureau of Mines; Pit & Quarry estimates.

FIG. 4 **Cement and cement clinker—imports for consumption (in million short tons and as percent of total finished cement shipments from mills)**



		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	mst	2.597	3.088	4.911	6.686	5.732	3.702	3.107	4.038	6.597	9.413
	percent	3.54	3.91	6.03	7.56	7.21	5.46	4.32	5.10	7.87	11.30
Cement ground from imported clinker	mst	N.A.	N.A.	1.576	2.673	1.904	1.240	1.024	1.483	3.036	4.171
Imported cement distributed by domestic producers	mst	N.A.	N.A.	N.A.	1.619	1.617	.980	1.201	.969	2.398	3.006
Imported cement distributed by other importers	mst	N.A.	N.A.	N.A.	1.862	1.643	1.302	0.911	0.880	0.989	1.470
U.S. exports of hydraulic cement	mst	.159	.110	.101	.325	.250	.365	.250	.122	.065	.160

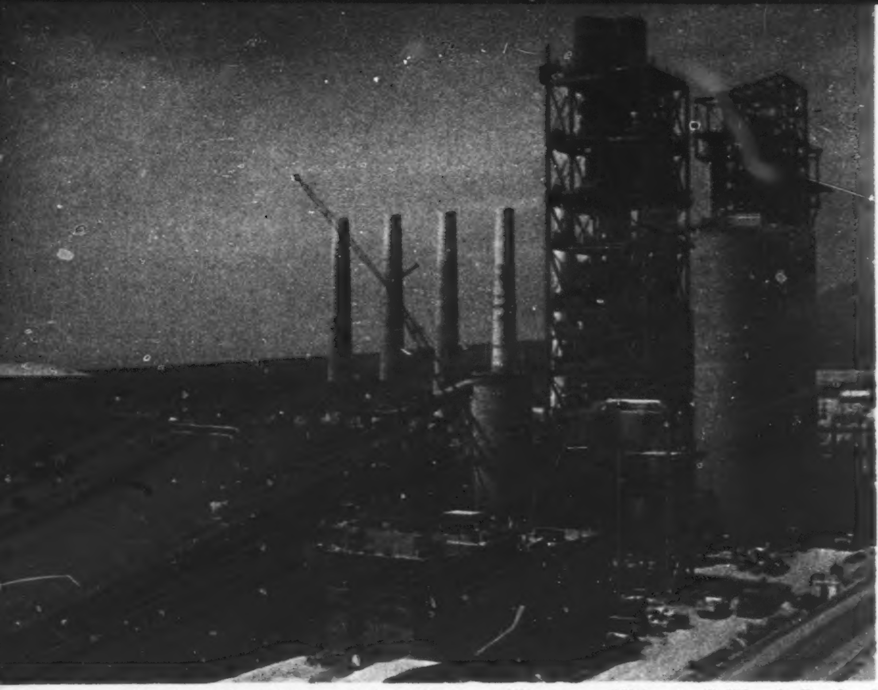
Source: U.S. Bureau of Mines

Construction

Construction contracts in 1981 will total $176 billion, 25% more than 1980's anticipated level of $140.4 billion, according to George A. Christie, chief economist for McGraw-Hill Information Systems Co. In his annual forecast issued last October, Christie estimated that the 1981 housing starts will total 1.65 million units. The mix predicted is 1.1 million single units, 180,000 condominiums, and 370,000 apartment units.

Christie expects nonresidential building contracts to total $50.6 billion next year, a 3% gain over this year's estimated $48.9 billion. Residential construction will come to $86 billion, a 44% jump over this year's $59.9 billion. Nonbuilding construction, expected to total $31.6 billion this year, will increase 25% to $39.4 billion.

Total new construction put in



. . . Scheduled for 1981 completion, the one million tpy addition to California Portland Cement's Mojave, Calif. plant incorporates a Fuller precalciner/preheater/flash furnace system. *(Courtesy: Kaiser Engineers, Inc.)*

place in the United States in 1979 amounted to $228.95 billion in current dollars, equivalent to a calculated $114.70 billion in constant 1972 dollars. A recent Commerce Department estimate gives a value of $228.3 billion for 1980 and $270.3 billion for 1981 total construction.

Regional analysis

Cement consumption and production shifted geographically in the 1970s from east to west and from north to south, PCA's economist Robert Roy points out in his forecast on U.S. cement consumption. This trend is expected to continue in the 1980s, and regional cement consumption figures will reflect this geographic move. For instance, cement use in PCA's South Central region is forecast to increase from 20.6% of total U.S. consumption in 1979 to 21.2% in 1985, a gain of 510,000 tons per year above the growth rate expected for the entire United States. The Rocky Mountain-Northwest, the Pacific Southwest, and the Southeastern regions are projected to show similar growth relative to total U.S. consumption in the next 6 years.

Individual state cement consumption should follow regional tendencies with few exceptions, Roy predicts. Cement use in any state that is a net energy producer should gain more than in net energy-consuming states. Also, cement consumption in states that encourage industrial development, such as Texas and Florida, will grow faster on the average than in states that do not, such as Oregon and California.

Antitrust litigation

Gifford-Hill & Co., Inc. and several other cement manufacturers have agreed to settle claims in a class action antitrust suit instituted against a number of cement and concrete producers. Gifford-Hill announced in August 1980 that it had reached an agreement to settle all claims in the cement and concrete antitrust litigation pending in the United States District Court for the District of Arizona. The agreement was reached in behalf of Gifford-Hill & Co., Inc. and its subsidiaries, Amcord, Inc. and Gifford-Hill Portland Cement Co., and is subject to approval of the court.

This class action litigation, initiated in 1976, contained two counts: one against the Portland Cement Association and 48 cement manufacturers, including Gifford-Hill and Amcord; and one against 15 ready-mix, grout and rock product producers in Arizona, including Amcord, Inc. The cement litigation originally was instituted in the United States District Court for the District of Arizona and various federal courts throughout the United States, by numerous public and private entities, and was consolidated in the Arizona court which certified the case to proceed in behalf of a national class of purchasers of cement and cement-containing products. The ready-mix count was certified by the court to proceed as a class action in behalf of purchasers of ready-mixed concrete and related products in the state of Arizona.

The settlement of the cement litigation provides for the payment of $8.25 million over a period of years. The settlement of the ready-mix litigation against Amcord, Inc. provides for the payment of $700,000. A related Arizona state court civil enforcement action against Amcord, Inc. and five others, also settled by Amcord, provides for the entry of a consent decree and the payment of $50,000 as a partial reimbursement for costs the state of Arizona incurred in connection with that litigation.

While Gifford-Hill and Amcord denied any violation of federal or state antitrust laws, a Gifford-Hill spokesman said the settlement agreement was made in an effort to avoid the further expense and uncertainties associated with protracted litigation.

Southdown, Inc. and its subsidiary, Southwestern Portland Cement Co., agreed to settle the cement antitrust litigation pending in the U.S. District Court for Arizona and a related Arizona state court action for an aggregate of $6.7 million.

River Cement Co., a subsidiary of IFI International S.A., has agreed to pay $1.75 million to settle the antitrust case against it. The Missouri company is one of 15 cement concerns accused by the state in 1978 of conspiring to fix cement prices. In the settlement, filed in the U.S. District Court in Arizona, the company denied wrongdoing, but entered into the agreement to reduce further expense, inconvenience, and the distraction of burdensome and protracted litigation.

California Portland Cement Co. announced last September that settlement agreements had been reached with respect to the remaining aspects of the antitrust lawsuits filed against the company in Arizona and consolidated there for pretrial proceedings that pertain to the sale of cement and cement-containing products. The settlement agreements, which require that the company make an immediate payment of $6.5 million into escrow accounts pending final approval by the respective courts before which the actions are currently pending, provide that, in the event of certain contingencies, the company has the option of terminating the settlements. The settlement agreements provide that payments made are not paid as a penalty, fine, or damages for any alleged offense; that the company specifically denies that it engaged in any illegal activity; and that nothing in the settlement agreements may be construed as an admission of liability.

Corporate changes

The corporate structure of the United States cement industry has undergone several major revisions in the past 2 years. The Flintkote Co. became a wholly owned subsidiary of Canada's Genstar Ltd. in 1980. Genstar has four cement plants operating in western Canada (one in each western province). Flintkote's four cement plants are located in Redding, Calif., San Andreas, Calif., Kosmosdale, Ky., and Glens Falls, N.Y.

While Genstar's head office remains in Montreal, the company has established executive offices in San Francisco. The company's operations in the United States are concentrated in the Sun Belt states, from the West Coast along the country's southern tier. Moore McCormack Resources, Inc. has agreed to purchase the Kosmosdale and Glens Falls cement plants from Genstar.

Gifford-Hill & Co., Inc. acquired Amcord, Inc. in December 1979. Gifford-Hill has planned its geographical growth to serve the Sun Belt market areas. Most of the company's construction minerals plants are concentrated within these states.

Before the purchase of Amcord, Gifford-Hill operated two cement plants—one in Texas and the other in South Carolina. The Amcord acquisition added five cement plants, two in California and one each in Arizona, Michigan, and Pennsylvania. The company plans to sell the Michigan and Pennsylvania facilities.

Lone Star Industries, Inc. continued its program of increasing its cement production capabilities. In September 1979, the company acquired the Portland Cement Company of Utah's plant in the heart of Salt Lake City. In March 1980, a Dixon, Ill. plant was purchased from Medusa Corp., a subsidiary of Crane Co. Lone Star acquired OKC Corp.'s newly-expanded cement plant at Pryor, Okla. in May 1980, and, in August 1980, OKC's cement plant and dock facilities in New Orleans, La.

The New Orleans transaction involved the exchange of Lone Star's New Orleans cement plant for OKC's plant plus cash payments. In turn, OKC agreed to sell the Lone Star facilities to Citadel Cement Corp., a subsidiary of Canada Cement Lafarge Ltd.

Citadel closed its Birmingham, Ala. 330,000-tpy wet-process plant in September 1980. Citadel will continue to use the plant's 55,000-ton storage capacity. The company operates a 750,000-tpy dry-process plant at Demopolis, Ala. (100 miles southwest of Birmingham).

OKC Corp.'s stockholders approved OKC's previously announced plans to liquidate last May. As noted, Lone Star has acquired the company's Oklahoma and Louisiana cement plants.

Penn-Dixie Industries, Inc. in April 1980 filed for protection under Chapter 11 of the Federal Bankruptcy Act. Under Chapter 11, the company continues to operate, but seeks court protection from creditor lawsuits while it tries to work out a plan for settling its debts.

Penn-Dixie's cement division operates plants in Nazareth, Pa.; Richard City, Tenn.; Kingsport, Tenn.; West Des Moines, Iowa; West Winfield, Pa.; and Petoskey, Mich. The company has agreed to sell its Nazareth plant to Coplay Cement Co. which is based in Nazareth. Coplay is a subsidiary of Societe des Ciments Francais.

McDonough Co., with operations that include the Gulf Coast Portland Cement Co., has entered into an agreement for a cash merger with Hanson Industries, Inc., a wholly owned U.S. subsidiary of Hanson Trust, Ltd., London.

Other changes in 1979 included: (a) acquisition of Florida Mining and Materials Corp. (with

Portland (Finished) Cement—Value of Shipments From Plants in the United States

	Total value (billion dollars)	Average value per short ton	
		In current dollars	In constant 1977 dollars
1970	$1.30	$17.69	$27.36
1971	1.48	18.74	27.58
1972	1.65	20.31	28.70
1973	1.90	21.88	29.23
1974	2.11	26.52	32.30
1975	2.11	31.09	34.55
1976	2.44	33.86	35.74
1977	2.83	36.36	36.36
1978	3.41	40.70	37.38 (est.)
1979	3.86	46.24	41.4 (est.)
1980 (est.)	4.1	—	—

FIG. 5

Masonry cement shipped by producers in the United States —Value*

	Total value (million dollars)	Average value per short ton
1970	$ 67.537	$22.68
1971	85.774	25.29
1972	102.115	26.52
1973	121.528	29.43
1974	113.030	32.93
1975	113.108	38.90
1976	140.855	42.63
1977	169.491	45.03
1978	209.701	50.53
1979	205.434	54.59

*Includes Puerto Rico.

FIG. 6

a cement plant in Brooksville, Fla.) by Moore McCormack Resources, Inc.; (b) sale of National Gypsum Co.'s cement operations to General Dynamics Corp. The division operates cement plants in Alpena, Mich. and Evansville, Pa.; (c) acquisition of San Antonio Portland Cement Co. in San Antonio, Tex. by a joint venture of Presa S.P.A. Cementeria di Robilante (Italy) and Cementwerke Vigier A.G. (Switzerland); (d) sale of River Cement Corp.'s (subsidiary of Missouri Pacific Corp.) Festus, Mo. dry-process plant to IFI International S.A., a European holding company based in Turin, Italy.

New/Planned projects

Cement plant start-ups, modernizations, and expansions in 1979 and 1980, and projected installations, are listed in this annual roundup. As of December 31, 1979, according to the Portland Cement Association, a total of 11.556 million tons of new or expanded cement capacity had been announced for the United States. Some older plants are expected to shut down, reducing net increases in cement capacity. Portland cement demand is expected to grow at a 2 to 3% rate for the next 5 years. The cost of building a new cement plant today has been estimated at about $100 per ton of annual capacity.

Cement plant data

Alamo Cement Co. (subsidiary: Joint venture of Presa S.P.A. Cementeria di Robilante (Italy) and Cementwerke Vigier A.G. (Switzerland))

- Bexar County, Tex. (outside the metropolitan area of the city of San Antonio): New $50 million clinker-producing plant is scheduled for operation late in 1981. Major equipment and process engineering will be provided by Polysius Corp. Equipment will include: Polysius roller mill for raw grinding; Polysius rotary kiln with Prepol preheater and alkali bypass; Claudius-Peters grate cooler; Polysius roller mill for coke and coal grinding; heat exchanger for recirculating vent air back to undergrate. Civil and structural engineering is being done by Consultec of Mississauga, Ont. Combined capacity from existing San Antonio plant (San Antonio Portland Cement Co.) and new Alamo Cement plant will be 1 million tpy.

Ash Grove Cement Co.

- Louisville, Neb.: Expansion project. Bendy Engineering Co. is providing engineering and construction management for clinker storage, rail unloading, services building, and other plant improvement projects. Humboldt Wedag will provide an 1,800-tpd precalciner kiln system.

Atlantic Cement Co., Inc. (subs.—Newmont Mining Corp.)

- Sparrows Point, Md.: Constructing a slag cement plant at Bethlehem Steel Corp.'s steel facility at Sparrows, Md. The $77 million project will include facilities to granulate and grind blast furnace slag from Bethlehem Steel's "L" blast furnace at Sparrows Point which produces in excess of 800,000 tons of slag per year. Facilities for producing the material will include four granulations, along with grinding and other facilities required for production and shipment by water of slag cement and other slag products. Davy McKee Corp. has been awarded the turnkey contract. The plant is scheduled for completion by mid-1982.

California Portland Cement Co.

- Mojave, Calif.: Addition of a 1-million-tpy plant to the existing 1.1-million-tpy facility is scheduled for completion in 1981. The Kaiser Engineers, Inc. division of Raymond International, Inc., has the contract to supply engineering, procurement, and construction management services for the estimated $100 million modernization and expansion program. Equipment will include: Fuller IHI precalciner; four-stage suspension preheater with flash furnace and 13½ ft. × 225 ft. rotary kiln section; Fuller grate clinker cooler; Allis-Chalmers 250-tph, 2,000-hp roller mill for raw grinding; Humboldt Wedag 1,500-tph impact crusher; Leeds & Northrup dual computer. Coal will be supplied for the plant by the company's Soldier Creek Coal division near Price, Utah.

Columbia Cement Corp. (subsidiary of Filtrol Corp.)

- Bellingham, Wash.: First phase of a $75 million plant expansion has begun. Plans include a new finish mill, new clinker facilities capable of handling clinker shipped in by water and rail, new cement storage silos, and new fuel handling equipment. Plant capacity will be increased to 750,000 tpy of finished cement in this first phase, estimated to cost $15 million. The $60 million second phase will include one kiln rated at 700,000 tpy of clinker, a new raw mill, and modernization of all other plant facilities.
- Zanesville, Ohio: Will undertake a $3.34 million equipment modernization program.

Flintkote Co., The (subsidiary of Genstar Limited)

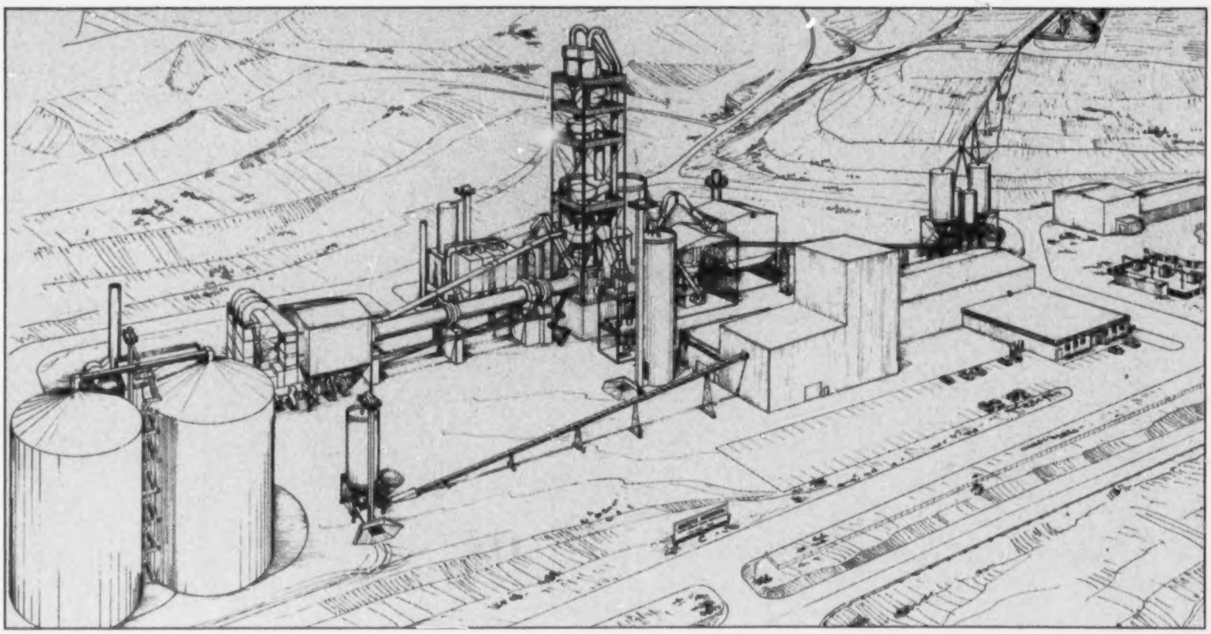
- Redding, Calif. (Calaveras Cement Div.): A $40 million expansion and modernization program, scheduled for 1981 completion, will increase capacity from 290,000 to 600,000 tpy. Equipment includes: F. L. Smidth precalciner/preheater system with 4.35 × 66m rotary kiln section and planetary cooler; 150-tpd raw roller mill; Foxboro control units. Engineering is being handled by Kaiser Engineers.

General Portland, Inc.

- New Braunfels, Tex. (Balcones plant): A new 925,000-tpy, $80 million dry process preheater plant, using coal as fuel, due on stream in 1981. Equipment supplied includes: Polysius 15 ft. × 241 ft., 2,750-tpd rotary kiln with Dopol preheater and Prepol precalciner; 237-tph roller mill; two 96-tph finish mills; C-E Raymond coal mill; Fuller grate clinker cooler; Mikropul dust collectors. Polysius Corp. provided engineering and supplied major equipment. Dyckerhoff Zementwerke AG, West Germany, acted as consultant on design and start-up.

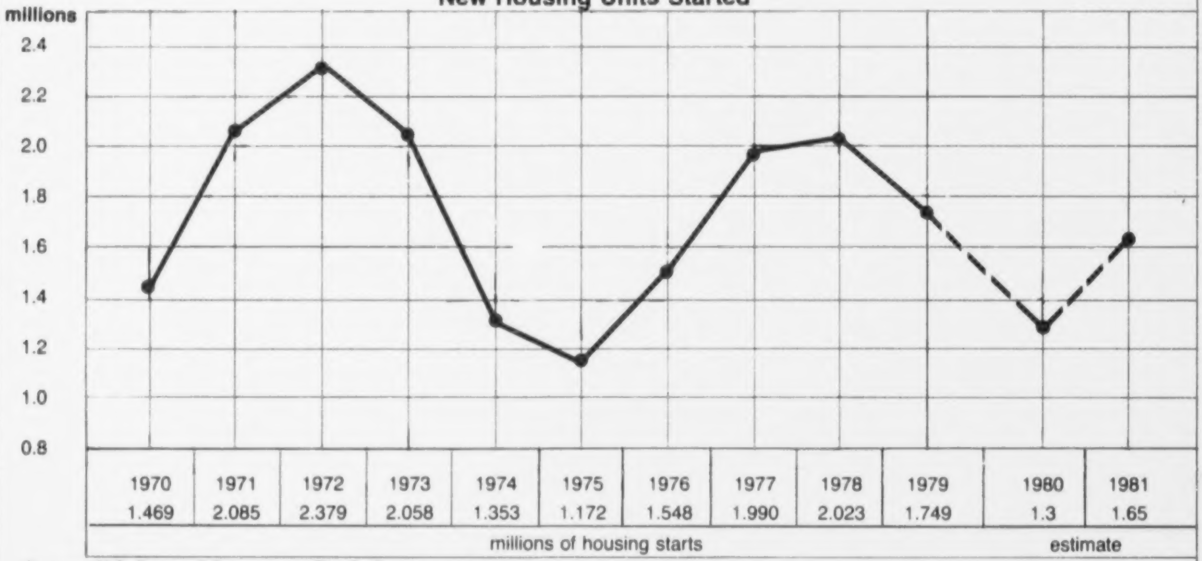
Ideal Basic Industries, Inc. (Cement Div.)

- Theodore, Ala. (near Mobile): New 1.5-million-tpy dry process (precalciner) plant is scheduled to



. . . Artist's conception of the new 1800 standard tpd dry process cement plant to be built at Leamington, Utah for the Martin-Marietta Cement Co. *(Courtesy: Fuller Co.)*

FIG. 7

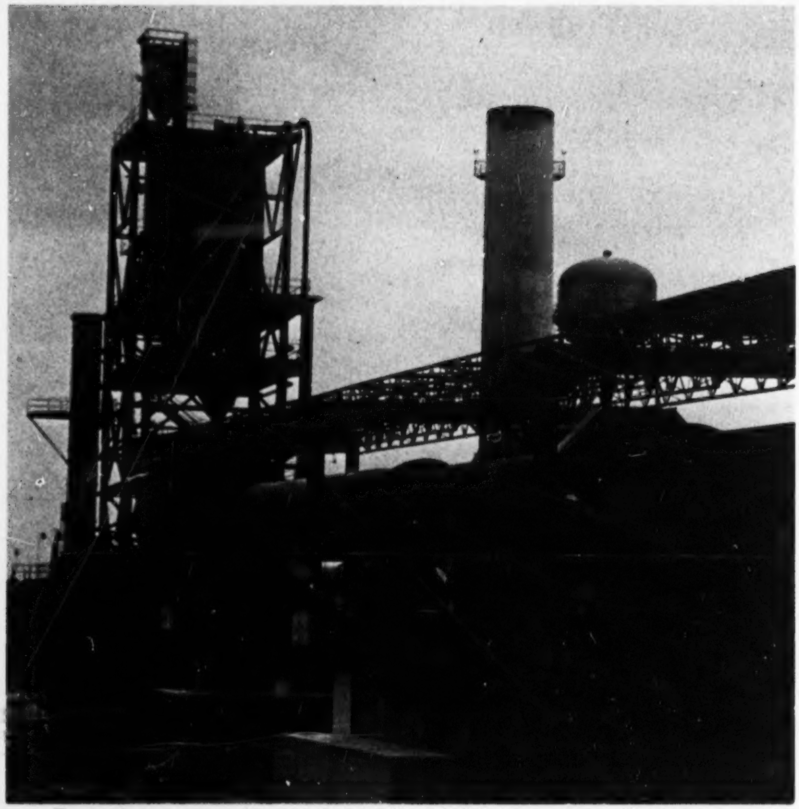


New Housing Units Started

Source: U.S. Dept. of Commerce; Pit & Quarry estimates.

be on stream in 1981. Estimated cost in 1977 dollars is $175 million. A quarry planned in Monroe County, Ala., will supply limestone. Equipment will include: Allis-Chalmers 4,660-tpd reinforced suspension preheater system, consisting of a 260 ft. high suspension preheater tower, a 16 ft. × 280 ft. rotary kiln, and a stoker-type clinker cooler; a Stamler feeder-breaker in the quarry; two Raymond coal mills; 65 Micropulsaire dust collectors; two 15 ft. × 48 ft. 3½ in. F. L. Smidth Unidan finish mills with 6500-hp. motors; four F. L. Smidth cement coolers. This plant eventually will replace the present Mobile plant. Brown & Root designed and are building this plant.

- Knoxville, Tenn.: Preheater-precalciner kiln was installed in 1979, replacing four kilns shut down in February, in order to convert the raw material system from wet to dry process. Capacity increased from 470,000 to 580,000 tpy. Equipment installed includes: Fuller suspension preheater with flash calciner and 12 ft. × 165 ft. rotary kiln section; Fuller grate clinker cooler; Mikropul dust collectors; Stamler feeder-breaker in quarry.
- Boettcher, Colo.: New grate preheater kiln will replace two 50-year-old kilns, to increase capacity from 115,000 tpy to 425,000 tpy. Scheduled for 1981 completion, the project will cost about $34 million. The preheater is especially designed to use the kerogen in the kerogen-bearing



. . . Expansion program increased capacity 280,000 tpy at Lone Star's Pryor, Okla. (formerly OKC Corp.) plant with addition of a Fuller 12×13½×400 ft. rotary kiln. *(Courtesy: Kaiser Engineers, Inc.)*

limestone available in the quarry deposit. According to calculations, the kerogen will provide about one-fourth of the fuel needed. Allis-Chalmers is providing the ACL system, including: 12 ft. 2 in. wide×112½ ft. long traveling grate; 14 ft.×15 ft.×204 ft. rotary kiln; 1,400-tpd roller mill; type MPS 3450, 110-tph roller mill; stoker cooler; 15-ft.-diameter pelletizer pan.

- Devil's Slide, Utah: A new 1-million-tpy plant is being planned to replace the present 360,000-tpy plant.

Kaiser Cement Corp.

- Permanente, Calif.: In a $78.5 million modernization program, a single preheater-precalciner equipped, dry process kiln will replace six oil-fired, wet process kilns. The dry process kiln will burn coal as well as other fuels. Rated capacity will remain the same at 1.6-million tons annually. Lafarge Consultants Ltd. of Montreal was awarded the contract covering engineering design services, procurement assistance, and start-up responsibility. The rebuilt plant was rescheduled for 1980 operation. The designed plant capacity is 1.6-million tpy. The equipment includes: an Allis-Chalmers 5,000-tpd reinforced suspension preheater with a 16 ft.×250 ft. rotary kiln section; two Raymond coal mills; two 15 ft.×53½ ft. Humboldt Wedag center-discharge raw mills, each equipped with a 5,000-hp single-pinion gear drive (preheater waste gases will be used for drying the mills).
- San Antonio, Tex. (Longhorn plant): A second preheater-precalciner tower will serve a dry process kiln installed during a partial modernization and expansion in 1975. The $14.5 million project will double the capacity of the kiln to 5,000 tpd. Equipment includes: Humboldt Wedag Pyroclon suspension preheater system with precalciner; new coal grinding system; additional clinker cooling; and new raw meal silo. On stream in 1979.
- Lucerne Valley, Calif.: Plans for a $124.5 million modernization and expansion program for this 1.015-million-tpy wet plant have been announced. A computer-controlled, preheater/precalciner kiln system will replace the wet process. Capacity is slated to increase to 1.5-million tons. Operation is scheduled for mid-1982. Equipment includes: 4,500-tpd Allis-Chalmers RSP tower, 300 ft. high and 16 ft.×250 ft. kiln; Claudius-Peters recuperator/cooler; 7,000-hp FLS center-discharge raw mill; 4,000 hp, 13 ft.×42 ft. Compeb Allis-Chalmers finish mill; baghouse for kiln and mill; digital process and motor control.

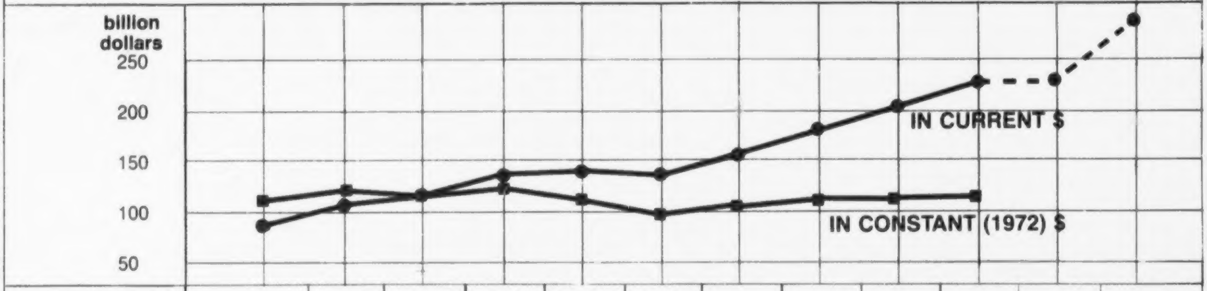
Lehigh Portland Cement Co. (subsidiary of Portland Zementwerke Heidelberg A.G., W. Germany)

- Alsen, N.Y.: Planning 315,000-tpy expansion; scheduled 1983.
- Union Bridge, Md.: Planning 500,000-tpy expansion.

Lone Star Industries, Inc. (Cement & Construction Materials Group)

- Santa Cruz, Calif.: Expansion and modernization, scheduled for late 1981 completion, will increase capacity from 395,000 to 750,000 tpy. Equipment supplied includes: F. L. Smidth four-stage preheater-precalciner unit with 13 ft.×184 ft. rotary kiln section; Folax grate clinker cooler; raw roller mill; homogenizing/kiln feed silos; new cement grinding mill; additional electrostatic precipitators; C-E Raymond bowl mill; 18-ft.-diameter air separator. Engineering planning was carried out by Bendy Engineering Co. and SPCM, Inc.
- Georgetown, Tex.: New 1-million-tpy plant to be constructed on property owned by Texas Crushed Stone, Inc.—scheduled for completion in 1982.
- Grantsville, Utah: Planning new 500,000-tpy plant, scheduled for completion in 1982.
- Salt Lake City, Utah (Portland Cement Co. of Utah): Added an Allis-Chalmers 11 ft.×300 ft. kiln to replace two small kilns and increased plant capacity 30% to 420,000 tpy (wet process). Other new equipment included a Fuller grate cooler and a Wheelabrator filter-bag dust collector. Donald R. Warren Co. was the engineering consultant. On

FIG. 8 **Value of Total New Construction Put In Place In The United States**



	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
In current $	94.86	109.95	124.09	137.92	138.50	134.54	151.05	173.98	205.46	228.95	228.3 estimate	270.3
In constant (1972) $	107.01	116.04	124.09	126.92	109.13	97.23	105.00	111.33	116.94	114.70	——	——

Source: U.S. Dept. of Commerce

FIG. 9 **Cement Consumption—By Portland Cement Association Region (Percent)**

						Estimates		
PCA Region	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1985**
Eastern	18.93%	17.20%	16.29%	16.83%	16.79%	17.2 %	17.1 %	15.2 %
Great Lakes—Midwestern	18.53	19.03	18.27	17.74	17.01	15	15.2	15.8
Southeastern	15.13	15.24	15.78	16.43	15.78	17.1	17	16.7
North Central	7.14	7.38	6.78	6.44	6.40	5.8	6	6.4
Rocky Mountain—Northwest	7.70	8.33	8.28	8.23	8.55	8.1	8.2	9.2
Pacific—Southwest	13.05	12.90	13.91	13.65	14.86	14.3	14.3	15.5
South Central	19.52	19.92	20.69	20.68	20.61	22.5	22.2	21.2
Total:								
Percent	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Million short tons	67.025	70.699	77.090	83.250	83.250	73.395	76.400	90.1

Based on data in "U.S. Cement Consumption Forecast," April, August, and October, 1980, Portland Cement Association, Robert Roy, Economist.

stream in 1979.

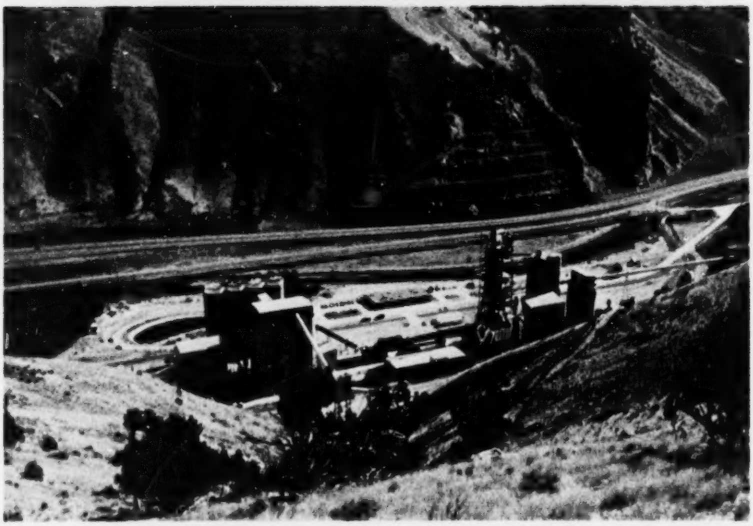
- Pryor, Okla. (OKC Corp., Oklahoma Cement Co. Div.): A $28 million expansion program increased capacity 280,000 tpy. On stream in 1979. Fuller Co. supplied most of the equipment, including: 12 ft. × 13½ ft. × 400 ft. rotary kiln; grate clinker cooler; 12 ft. × 26 ft., two-compartment ball mill; bag-type dust collectors. A C-E Raymond coal mill also was installed. This was a Kaiser Engineers project.

Marquette Co. (Subs. of Gulf & Western Industries, Inc.)

- Cape Girardeau, Mo.: New $80 million, 1.2-million-tpy dry process plant at the same location. Kaiser Engineers is providing engineering, procurement, and construction services. Completion is scheduled for early 1981. Equipment supplied is to include: Allis-Chalmers four-stage reinforced suspension preheater with a 14.5 ft. × 235 ft. rotary kiln section; Allis-Chalmers stoker-type grate clinker cooler; two Allis-Chalmers 13 ft. × 52 ft., 4,500-hp Compeb finish mills; C-E Raymond raw roller mill rated at 250 tph and driven by a 3,000-hp motor; two Raymond 21-ft. diameter air separators for the finish mills; two C-E Raymond bowl-type coal mills; Envirotech-Buell electrostatic precipitator; baghouses; and cyclone dust collectors. Instrumentation will be a combination of Eagle Signal, G & W Manufacturing Co., and Swanson Engineering Co. equipment and will incorporate an on-line computer system consisting of three CRTs with a complete plant display panel board.

Martin Marietta Corp.

- Buffalo, Iowa (near Davenport): New 850,000-tpy, $80 million dry process coal-fired plant is scheduled to go on stream in 1981. Equipment to be supplied includes: F. L. Smidth preheater/precalciner kiln with 14 ft. × 200 ft. rotary kiln section and a 924S Folax grate cooler; Allis-Chalmers multi-compartment rotary Compeb mill, 15 ft. × 53 ft., 7,000 hp; Allis-Chalmers 230-tph roller mill, 1,500 hp. Kaiser Engineers is providing engineering and design services.
- Lyons, Colo.: Long-kiln, dry process plant conversion to flash calcining system via a $6.8 million contract with Fuller Co. The 14¼ ft. × 17 ft. × 490 ft. rotary kiln will be cut to 14¼ ft. × 245 ft. A Fuller SF 135 suspension flash calciner, with a modified Stage IV cyclone, will be used to preheat and partially calcine the raw materials. The plant's existing direct coal-fired system will be converted to a semi-direct system to permit use of pulverized coal for the kiln and the flash calciner. After the conversion, rated capacity will be 1,250 tpd. Kerogens in the shale portion of the raw materials will be burned off in the flash calciner. Start-up was scheduled for 1980.
- Leamington, Utah: New 650,000-tpy plant scheduled on stream in 1982. Fuller Co. and S.&W. Construction Co. of Tennessee are joint venturers on the $67.5 million project. Fuller will provide design, engineering, and equipment for the plant. S.&W. Construction will build the plant near Leamington, about 100 miles south of Salt Lake City.



. . . Oregon Portland Cement Co.'s new 500,000 tpy plant in Durkee, Oregon (see Pit & Quarry, July 1980) includes F.L. Smidth's 4-stage cyclone preheater unit with rotary kiln section and Unax cooler.

Fuller equipment will include: 1,800-tpd suspension preheater/flash calciner/coal-fired rotary kiln; Fuller-Loesche roller mill, 160 tph; two Airmerge blending systems, rated at 3,000 tons each; FK pump for raw mix; coal roller mill; inclined grate cooler; heat exchanger; Plenum-Pulse dust collector; and a 13½ ft. × 47 ft. finish mill.

Medusa Cement Co. (subs. of Crane Co.)

- Charlevoix, Mich.: Conversion from wet to dry process in a $50 million project; capacity increase from 2,400 to 4,400 tpd in the dry process; on stream in 1980. Kaiser Engineers handled engineering, equipment procurement, and construction management services. Equipment includes: Fuller four-stage suspension preheater/flash calciner system; AAF-Elex electrostatic precipitator; Polysius 360-tph double-roller raw mill; C-E Raymond coal bowl mill; Fuller Airmerge blending system; gravel-bed clinker cooler; Foxboro electric control system. The existing 18½ ft. × 17 ft. × 18½ ft. × 580 ft. rotary kiln was cut to a 18½ ft. × 17 ft. × 350-ft. length.

Monolith Portland Cement Co.

- Monolith, Calif.: Doubling capacity to 1-million tpy. Equipment ordered includes: F. L. Smidth 12 ft. × 13½ ft. × 450 ft. wet process rotary kiln rated at 900 tpd; Folax clinker cooler; Tirax coal mill. Scheduled on stream in 1981.
- Laramie, Wyo.: Increasing capacity from 200,000 tpy to 500,000 tpy, with addition of a new kiln, clinker cooler, coal mill, finish mill, pollution control equipment, and associated equipment. Scheduled on stream in 1980.

Moore McCormack Resources, Inc.

- Brooksville, Fla. (Florida Mining & Materials Corp.): A $68 million expansion program will double plant production to 1.2 million tpy. The company is adding a second coal-fired kiln and is increasing grinding and storage capabilities. New kiln is expected to be operational in 1982. Polysius will supply the equipment, including: Gepol preheater/kiln rated at 1,650 tpd; Air-swept raw mill, 153-tph capacity; two-compartment finish mill rated at 100 tph; and related equipment and instrumentation. Fuller Co. will supply two fabric-filter, dust-collection systems.

Oregon Portland Cement Co.

- Durkee, Ore.: New 500,000-tpy $37 million dry-process plant placed on stream in 1979. F. L. Smidth supplied most of the equipment, including: four-stage cyclone preheater unit with rotary kiln section and Unax cooler; 2,100-hp Tirax Unidan drying and grinding mill; homogenization system; 4.35 × 66m gas conditioning tower and precipitator; Tirax coal mill; 4,000-hp Unidan 13 ft. × 47¼ ft. finish mill; cement coolers; and electrostatic precipitators.

SME Cement, Inc.

- Middle Branch, Ohio: Former Diamond Portland Cement Co. plant, purchased in 1960 by Flintkote, was sold by Flintkote to Standard Machine and Equipment Co. in 1977. The plant was incorporated as SME Cement Inc. in 1978 as a wholly owned subsidiary of Standard Machine & Equipment. Two of the plant's kilns, all of which had been shut down, were again placed in operation in 1979, with an estimated capacity of 1,000 tpd.

Texas Industries, Inc.

- Hunter, Tex.: New 550,000-tpy $50 million dry-process plant on stream in 1980. Equipment includes: Polysius 12 ft. × 284 ft., 2,000-tpd rotary kiln with Dopol preheater and Prepol A5 precalciner; 165-tph roller mill; homogenizing systems; and central control panel and instrumentation. ●

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Construction

After sharp decline in '80, construction should rebound in '81

BY JIM KOSTKA

Forecasters of the construction industry probably were in a frenzy in October 1980 when interest rates suddenly surged upward after being relatively stable for a period of about 6 months. These prognosticators of what is in store for the construction industry in 1981 had already made their predictions and were waiting for the appropriate time to release them. When the prime rate on borrowable money jumped from 13 to 16¼% within a 4-week period between late October and mid-November, the forecasters made a mad scramble to revise their figures for both 1980 and 1981 construction.

This dilemma, facing those who try to predict what will happen in the construction industry, clearly illustrates how sensitive this industry is to the cost of borrowing money. Rising interest rates cause construction projects to be postponed until such time when lower rates make borrowing money more attractive. Stated simply, when it becomes more expensive to borrow money, construction declines. Conversely, when it costs less to borrow money, construction activity is stimulated.

Most recessions in the past have been caused by the unavailability of financing capital. This is not true this time. Plenty of money is available, but it's too expensive to borrow. This is the result of a preconceived plan by the government to raise the prime interest rate in order to control the inflation which has plagued us for a number of years. So far, the policy has slowed inflation to some extent but not to the degree anticipated.

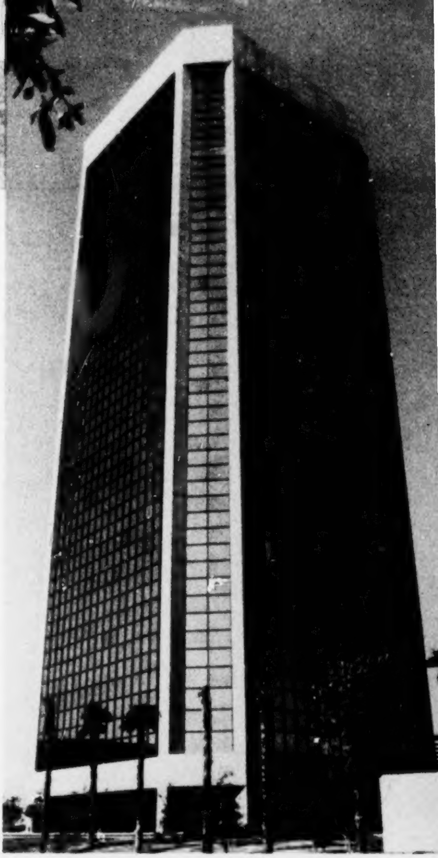
In spite of the high level of interest rates late in 1980, the two major forecasters of the construction industry—F.W. Dodge and the Commerce Department's Bureau of Industrial Economics (BIE)—predict construction gains for 1981. Both feel interest rates will have peaked by the end of 1980 and will ease downward gradually in 1981. As a result, construction activity is expected to climb.

Because these two construction forecasters do not cover all of the same construction categories (BIE is broader in scope), a direct comparison can't be made of their individual forecasts. Keeping this in mind, F.W. Dodge anticipates a 25% increase in the dollar value of construction in 1981 while BIE is looking for an 18% gain.

Based on the Bureau of Industrial Economics figures, the value of U.S. construction in 1980 was $228.3 billion. This is slightly below the 1979 total. Some optimism is shown in the BIE 1981 figures which indicate construction will rise to a total of $270.3 billion—an 18% increase. However, due to the existing inflation factor, the actual physical amount of construction put in place will show an increase of about 6%. This, of course, could go considerably higher if interest rates would decline rapidly, but the prospect of that happening is rather remote.

Private construction

More than three times as large as public construction, the private construction sector exerts a considerable amount of influence on the construction picture as a whole. In 1980, the value of private construction amounted to $171.6 billion—5% below the previous year. In 1981, private construction is expected to bounce back with a 20% gain when its total reaches $206.7 billion. A substantial part of this increase will come from new housing units which are counted on to register a 37% increase in value.



Public construction

The public construction sector, which fared better than the private sector in 1980, moved upward by $7.7 billion over the previous year; its total reached $56.7 billion. This was an increase of 16%. A continued gain is forecast for this type of construction in 1981, but at a more moderate rate of climb. The value will reach $63 billion, surpassing the previous year's total by 12%.

Although all segments of public construction are expected to register gains in 1981, except for hospital construction which is expected to remain the same as 1980, the housing and development and highway and streets construction will provide the largest gains.

Because public construction is government-funded, the various types of construction making up this segment of the construction industry remain at a fairly even keel and do not experience the sharp rise and fall of some of the segments in the private sector.

Type of construction	(In millions of current dollars) 1979	1980[1]	Percent change 1979-80[2]	1981[1]	Percent change 1980-81[2]
Total new construction	228,950	228,300	0	270,300	+ 18
Private construction	179,948	171,600	− 5	206,700	+ 20
Residential buildings	99,030	84,000	− 15	109,800	+ 31
New housing units	78,587	60,800	− 23	83,000	+ 37
Additions and alterations	18,236	20,000	+ 11	23,000	+ 15
Nonhousekeeping	2,206	3,200	+ 45	3,800	+ 20
Nonresidential buildings	47,298	53,100	+ 12	60,700	+ 14
Industrial	14,950	13,800	− 8	15,200	+ 10
Office	9,461	13,200	+ 40	17,200	+ 30
Other commercial	15,463	17,800	+ 15	19,600	+ 10
Religious	1,548	1,600	+ 5	1,700	+ 5
Educational	806	1,200	+ 50	1,300	+ 10
Hospital and institutional	3,530	3,500	0	3,500	0
Miscellaneous	1,540	2,000	+ 30	2,200	+ 10
Farm, nonresidential	5,700	5,700	0	5,700	0
Public utilities	26,467	27,300	+ 3	28,900	+ 6
Telephone	6,343	7,300	+ 15	8,400	+ 15
Electric light and power	16,009	15,200	− 5	13,700	− 10
Gas	2,266	2,700	+ 20	4,300	+ 60
Railroad	1,259	1,500	+ 20	1,800	+ 20
Petroleum pipelines	591	600	0	700	+ 10
All other private	1,452	1,500	0	1,600	+ 10
Public construction	49,003	56,700	+ 16	63,600	+ 12
Buildings	15,857	18,100	+ 14	20,100	+ 11
Housing and redevelopment	1,211	1,600	+ 35	2,000	+ 28
Industrial	1,411	1,800	+ 30	2,300	+ 30
Educational	6,903	7,700	+ 12	8,500	+ 10
Hospital	1,648	1,600	0	1,600	0
Other public	4,684	5,400	+ 15	5,700	+ 5
Highways and streets	11,915	15,500	+ 30	17,800	+ 15
Military facilities	1,640	1,700	+ 5	2,000	+ 20
Conservation and development	4,587	5,000	+ 10	5,500	+ 10
Other public construction	15,002	16,400	+ 9	18,200	+ 11
Sewer systems	7,298	7,700	+ 5	8,500	+ 10
Water supply facilities	2,490	3,500	+ 40	4,200	+ 20
Miscellaneous	5,215	5,200	0	5,500	+ 5

[1] Estimated by Bureau of Industrial Economics

[2] Percent changes were derived by using unrounded figures for projected data.

Source: Bureau of the Census and Bureau of Industrial Economics (BIE)

Residential buildings

An example of the importance of this particular construction category is its relative size. In 1980, private residential construction totaled $84 billion and represented 37% of all construction that year. This category is counted on to capture an even greater share of the construction market in 1981 when it jumps to $109.8 billion, a 41% slice of the entire construction dollar volume. New housing units will be the primary reason for this gain. A drop of 23% caused this category to fall to $60.8 billion in 1980. However, in 1981, predictions say it will soar 37% by reaching $83 billion.

Housing starts, which were running at a rate of 2 million units 2 years ago, dropped to 900,000 in May 1980. When interest rates on home loans fell to about 12% during the summer, customers resumed shopping for new homes. In September, housing starts rose to an annual level of 1.5 million units, but the increase was largely due to federally subsidized apartments that builders had to get under way before September 30 when the government closes the books on its fiscal year. And although interest rates rose sharply during the middle of the last quarter of 1980, economists feel the rates are headed toward a gradual decline starting early in 1981, thereby stimulating a demand for residential construction.

After dropping to an estimated total of 1.25 million units in 1980, housing starts are expected to bounce back to a total of 1.65 million units in 1981, according to F.W. Dodge. This total is most likely to consist of 1,100,000 singles, 180,000 condominiums, and 370,000 apartment units.

The United States needs an estimated 2.4 million new dwellings annually to meet existing demand, but only once in the past 5 years (in 1978), has the housing industry come close to that mark. This is causing a pent-up need for housing, and, as this need accumulates, prices on existing housing continue to escalate.

At 1981 prices and interest rates, not every family that seriously intends to purchase a new home will be able to realize that goal. Therefore, the alternative in many cases will be going into apartments, condos, existing one-family homes, mobile homes, conversions, or rehabbed units. Of these various options, condominiums, with their advantage of value appreciation and tax deduction, are obviously the most viable alternative to conventional one-family ownership of this segment of the housing market. This type of housing also has considerable appeal to couples who have raised their families and are alone because their children have married and left home.

Expenditures for additions and alterations will continue to rise, going from $20 billion in 1980 to $23 billion in 1981, an increase of 15%. It is a common practice during a recession period for people to make-do until times get better and, as a result, more money is spent on home improvements than during normal times when buying a new house would have greater appeal.

Non-housekeeping construction, which consists largely of hotel and motel construction, rose a substantial 45% in 1980 to $3.2 billion. It appears destined to grow another 20% in 1981, reaching a total of $3.8 billion.

Nonresidential buildings

This category consists of industrial, office, other commercial, religious, educational, hospital, and institutional buildings. Combined, all nonresidential buildings construction will be up a modest 14% in 1981 with a total of $60.7 billion.

Industrial construction, which was down 8% in 1980, will be up 10% in 1981, reaching $15.2 billion. Office building construction, although easing off a bit from its 40% gain in 1980, will show a respectable increase of 30% in 1981 by reaching the $17.2 billion mark. Other commercial building will move up a bit to $19.6 billion—a 10% gain. Religious and educational construction are counted on for respective increases of 10 and 5% and values of $1.7 and $1.3 billion. Hospital and institutional construction, however, will show no gain, remaining at $3.5 billion.

Farm construction

Nonresidential farm construction has been static for the past 2 years, remaining at $5.7 billion. No change is anticipated for 1981 when farm construction continues to move laterally. For a number of years, the trend has been toward fewer, but larger, farms. This has discouraged some would-be farmers from getting into farming and, as a consequence, new farm construction has suffered. This swing toward larger farms will continue because the small farmer can't afford the expensive equipment used by the large producers; therefore, he is unable to compete on an equal basis.

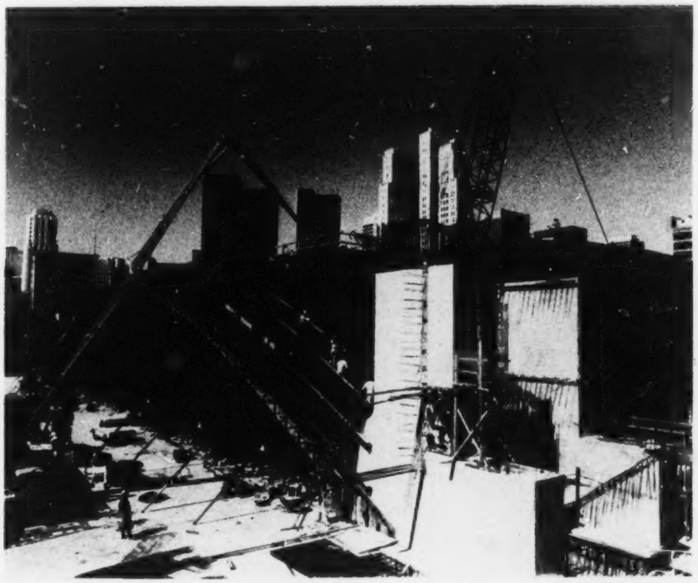
A 17-story housing structure for the elderly using precast components. The value of new housing units will show a 37% gain in 1981 after a 23% decline in 1980.

Public utilities

All public utility construction, except electric light and power, will show an increase in 1981. Leading the gains is the gas segment with an increase of 60%. Much of this gain is due to several new pipelines that have started or are about to start construction.

Apparently, the drop in electric light and power construction is the result of the anti-nuclear sentiment shown by a very vocal group in this country. Because of their protests, a number of atomic powered facilities in various stages of construction have stopped building. However, since President-elect Ronald Reagan is in favor of the use of atomic energy for producing electricity, this impasse may be over soon.

The construction of telephone



Construction of San Francisco's Moscone Center under way. This $115-million structure will add to the value of miscellaneous nonresidential buildings in 1981 when it is due to be completed.

facilities appears to be headed for a 15% gain, the same as 1980. An increase in family formations and housing starts will be necessary before this public utility segment shows a more dramatic increase.

Railroad construction will be up 20%, a repeat of its 1980 gain. Most of the construction by this segment will be repair of roadbeds that have been neglected by the railroads for quite some time.

Petroleum pipelines should ease upward about 10% in 1981, after showing no gain in 1980. As new oil fields are discovered, new pipelines will have to be built to distribute the oil.

The combined public utility construction, with a 6% increase in 1981, represents the smallest gain of any construction category. Much of this is due to the poor showing electric light and power construction is expected to make. In dollars, this category will reach a value of $28.9 billion in 1981; it was $27.3 billion in 1980.

Public buildings

Led by public housing and redevelopment's projected 28% increase in 1981, this construction category will post a 12% gain in 1981—slightly below the 14% increase registered the year before.

The largest segment of this category, educational construction, should be up 10% with $8.5 billion worth of construction, followed by other public, industrial, and housing and redevelopment with figures of 5, 30 and 28% on the plus side, respectively. Hospital construction, the only segment of this category not expected to show a gain in 1981 will have $1.6 billion in construction, the same as the previous year.

Highways and streets

The substantial 30% recorded by this category in 1980, with a value of $15.5 billion, will be curtailed a bit in 1981 when construction of this type climbs to $17.8 billion for an increase of only 15%. Although no major highway construction projects are scheduled for 1981, a considerable amount of repair work is needed on existing highways and roads. Much of the 42,000 miles of construction put down for the federal highway program is now more than 20 years old; some of it badly needs repair. Therefore, keeping this major highway network in repair, plus the many other highways and roads that require maintenance, creates a never-ending demand for construction in this category.

Military facilities

Government spending for military facilities has been held down in recent years because of the attitude that money alloted to this category could be better spent elsewhere. This feelng is beginning to change and will continue to do so with Ronald Reagan as president. When campaigning for the office, he promised that our arms capabilities would be built up to a point where we would not have to fear any foreign power. In doing this, military facilities would have to be expanded.

In 1981, the value of military facility construction will be up 20% as it reaches the $2 billion level. This compares to a total of $1.7 billion and an increase of 5% in 1980.

Conservation and development

The 10% gain in construction in this category will be matched by a similar increase in 1981. Value of 1981 construction will amount to $5.5 billion.

In an effort to conserve natural resources and rehabilitate the land, a strong push is being made on the local and federal level to regulate the use of the land and the minerals it contains. Various laws and regulations have been passed to ensure that the land is returned to its previous natural condition.

Other public construction

This category consists of sewer systems, water supply facilities, and miscellaneous construction. Combined, construction in this category totaled $16.4 billion in 1980, representing a 9% increase over the previous year. A further gain of 11% is in prospect in 1981 when the total is slated to reach $18.2 billion.

Water facilities are counted on for a 20% gain in 1981 with a total of $4.2 billion. Sewer systems should be up about 10% and reach a total of $8.5 billion. Miscellaneous construction in this category showed no gain in 1980, but will rise about 5% in 1981 and reach $5.5 billion.

Construction in this particular category is related to housing starts. As the demand for housing grows, so does the need for water and sewer systems; therefore, the outlook for this particular category is bright because housing starts are certain to rise during the next several years. ●

From national association leaders:

CEMENT INDUSTRY FORECASTS MODERATE DEMAND RISE

Richard E. Reuss
President
Portland Cement Association

Cement demand in 1980 declined about 12% compared with 1979. A moderate increase in shipments is expected in 1981, although the upturn is forecast to be limited to about 4% in view of the persistent sluggishness of the construction sector.

Home building is projected to rise as much as 34% from its 1980 recessionary low, although industrial and commercial construction may continue to fall through mid-year 1981. Nonbuilding construction will stay at 1980 levels and the public building sector is expected to continue its long-term decline. Further, it is likely that high interest rates and inflation throughout the year will continue to impede construction activity in all categories.

We expect 1980 cement consumption in the United States to total about 73.4 million tons. Although volume this year was 12% below 1979 demand, shipments still were 9% ahead of the 1975 low in the previous recession.

U.S. cement manufacturers have not had to bear the full burden of a declining 1980 cement market because a sharp decrease in cement and clinker imports accounted for as much as 40% of the total drop in U.S. cement consumption through the third quarter. For all of 1980, imports apparently will total only about half the record 9.4 million tons imported in 1979.

Construction outlook

As usual, housing will be the key to any significant recovery in the construction sector. If we assume that there will be some improvement in inflation and interest rates in 1981, home building is expected to rebound noticeably—from 1.2 million starts in 1980 to 1.6 million in 1981. In terms of square feet of construction contract awards, residential building is expected to grow 34% to about 2.3 billion sq. ft. This favorable outlook assumes that mortgage rates will stabilize by mid-year at about 12% or lower, and that the savings and loan industry will have sufficient funds to support the higher level of activity.

Industrial and commercial construction remained relatively strong in the first half of 1980 but began its decline in the second half under the pressure of high interest rates; the sector will continue to show weakness at least through the first half of 1981. Construction of manufacturing and office facilities is expected to decline by 8% to 850 million sq. ft. next year.

However, when industrial and commercial building does recover, it should not be impeded by a large inventory of unoccupied floor space as it was in 1976. Vacancy rates have remained low and rentals have been firm through 1980 in most regions. Moreover, the demand for office buildings will be high through the 1980s, and the drive to increase labor productivity and energy efficiency should spur industrial construction as well.

Nonbuilding construction in 1980 was depressed by the Administration's attempts at budget-balancing. For 1981, nonbuilding will grow only about 10% in real terms under the austere federal budget proposed for fiscal year 1981. Normally, a much larger gain in nonbuilding construction could be expected after a very weak year like 1980.

Finally, public building is expected to drop 9% this year and remain flat in 1981. This sector is in long-term decline, now accounting for less than 7% of all construction compared to 15% in the late 1960s.

1981 cement outlook

For 1981, cement consumption is forecast to increase by 4% to approximately 76 million tons with most of the gain coming from residential construction.

All regions in the country are expected to perform better, although the largest gains will likely be in the Great Lakes-Midwest, North Central, and Rocky Mountain-Northwest regions, the areas which experienced the sharpest declines in 1980.

Post-recession outlook

A 6-year forecast, published by the Portland Cement Association in August 1980, indicates that cement demand may reach an average of 85 million tons per year following the current recession.

The forecast predicts that cement shipments will recover slowly in 1981, then rise more sharply through 1985, possibly reaching 90 million tons as early as 1983. The PCA projection is a consensus forecast based on separate estimates of housing activity made by three organizations—Data Resources, Inc.; Townsend-Greenspan & Co.; and the National Association of Home Builders.

Although the three housing forecasts differ in their cyclical patterns, the projections all assume a marked increase in new household formations and a resulting high demand for new housing units in the next 5 years.

If it does occur, the projected increase in housing and housing-related construction will produce the highest growth rate in cement consumption since the 1950s. But, this is not to say that the cement industry will be unaffected by negative influences in the post-recession period. Government regulation, inflation, and high capital and energy costs will continue to hinder the growth of all industries, including cement. Financial market developments will be especially critical to the construction and cement industries, and persistently high interest rates could severely restrict building. In addition, domestic cement producers face tough competition from manufacturers of other building materials.

As we view the pent-up demand for new construction in the 1981-1985 period, however, the cement industry's prospects for a period of record growth in the 1980s become increasingly bright.

CRUSHED STONE REVIEW

William L. Carter, President
National Crushed
Stone Association

The aggregates industry historically has lagged 6 to 12 months behind a general business recession—going into economic decline and coming out. Accordingly, NCSA surveyed its membership in April of this year in an effort to track the economy of the industry more closely and aid the industry in predicting economic turns. Subsequently, the National Bureau of Economic Research has decided on January 1980, as the official beginning of the recession in the United States. That designation corresponds to NCSA's previously announced predictions, including the association's forecast of at least a 6-month lag period for the industry—until June or July when the real crunch would be felt.

Almost every crushed stone producer whom the association contacted in April—both large and small operators in every region of the country—foresaw a significant decrease from the 1979 volume levels in 1980 and 1981. It seemed probable at that time that, since much of the industry was engaged in precontracted work, business would hold stable into or through the third quarter of 1980, with a sharp decline in the fourth quarter.

At the same time, most producers projected a sharp upturn in volume in either late 1981 or in 1982. They were recognizing, for the first time, definite indications of a trend in the industry's economy. For example, while steady annual growth in volume was forecast by most producers after 1981, another decline was foreseen in 1986. The pattern is a cyclical one, beginning in the late 1960s. A short recession, perhaps better termed a "slump," occurred in 1967-1968; a relatively short but more severe recession occurred in 1974-1975. And now the industry faces what many think will be a 1980-1981 recession, although there are reasons to believe its severity and duration may be more sustained.

The aggregates industry has become subject to a cycle of economic trends, and downturns in the general economy have begun to have a progressively more pronounced effect on it than in the past. It is likely that for the aggregates industry, with its lag period, the 1980 recession will indeed be long and deep.

To explain this forecast requires a retrospective look at the many years of national economic stability and market stability for the aggregates industry. An examination of the sources of that stability reveals a great deal about the cause of the current volatility.

For nearly 30 years, until the early 1970s, there was rapid growth in the aggregates industry. Construction of the Interstate Highway System, beginning in 1956, accounted for stability following the Second World War and the Korean conflict and continuing through the 1960s. Contributing to the prosperity of the late 1960s and early 1970s was the housing and general construction boom which resulted from the "World War II babies" entering the job and home markets. These phenomena, occurring in a balanced, stable economy with a low inflation rate, served to insulate the aggregates industry from the trends of the general economy.

But the industry has indeed become susceptible to the economic turns of the primary private market in the last 15 years, particularly in the last 5 to 10 years. Severe "supply side" problems have occurred in basic industries such as agriculture and energy and have had a dramatic negative effect on inflation and high interest rates. In turn, persistent inflation and interest rates have led up to the severe "demand" problems seen in the auto, steel, housing, and general construction industries, while causing consumer prices in those industries to jump skyward.

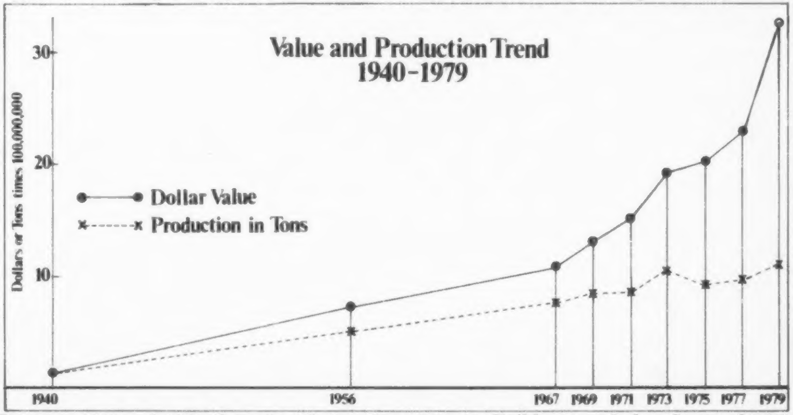
No less important, with major interstate highway work completed and Congress ostensibly trying to tighten its belt on public works projects of all kinds, public works funding now accounts for an ever-diminishing percentage of total aggregate sales. Both primary markets—the public and the private—are in decline today. Crushed stone producers are expressing grave concern not only about the future funding of public works, but also about the amount of in-place construction which the forecast dollars will be able to purchase. In short, public works no longer smoothes over the fluctuations in the primary private market.

It is exceedingly difficult to say whether inflation, in itself, is a cause or a result of general economic conditions. Doubtless, it is incorrect—futile at best—to assign blame to any single component factor in the economy. There are those who champion "supply side" economic policy as the great savior, and those who take the view that the economy needs to be bolstered on the "demand side" in order to invigorate the economy and reduce inflation. The mean between the extremes usually holds the most truth: the imbalance among the most basic commodities in the economy—some suffering demand problems and others supply side problems—has forced a rise in prices and a subsidence in healthy economic activity. Since the first minor industry recession in 1967-1968 and particularly since the 1974-1975 recession, the effect of declining production volume on total dollar value of production has been wholly dependent on the whims of inflation. The trends, however, indicate that as inflation escalates, the economic dip becomes more severe and prolonged; the recovery becomes shorter in duration, sharper in production volume, but especially sharper in dollar value.

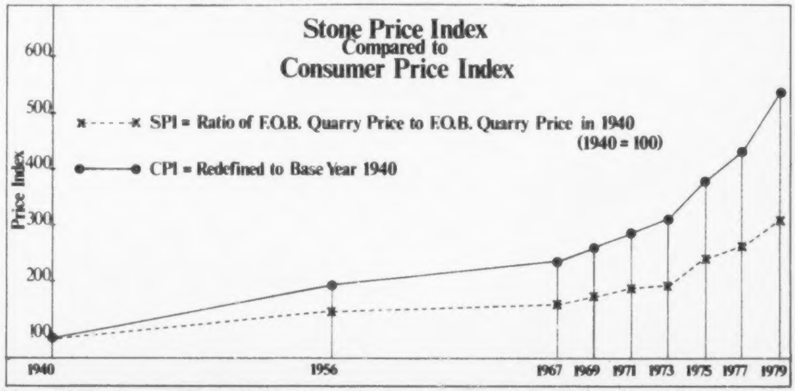
All of this is verified by another recent informal survey of NCSA's membership. The April survey, which had indicated that pre-contracted work would last into or perhaps through the third quarter of 1980, has not held. It was hoped that pre-contracted work would maintain total production and dollar value at reasonably stable levels for the year. But in the absence of new contracts, pre-contracted work was largely completed by the beginning of the third quarter. In some parts of the country, particularly in the Midwest and Northeast, that work did not even hold through the second quarter.

Despite what pre-contracted work there was for the crushed stone industry in the first two quarters of 1980, NCSA's survey of producers in different parts of the country consistently indicates that production volume will be down 12% or more in 1980. Some producers in the Midwest see drops in volume of more than 30%. Producers in New England seem to be facing state and local governments that simply do not have any money. Again, the most frightening aspect of such sharp drops in volume is to be seen in the consecutive-year trends. For insance, 1973 was at that time a record production year for the stone industry. Even so, from 1973 to the end of the 1974-1975 recession, production fell off 14.8%.

To the surprise of many, including producers and the U.S. Bureau of Mines, 1979 turned out to be an all-time record production year. So now, with the prime interest rate having risen to 20%, it should not be surprising to see production volume drop to the 900 million ton level by the end of



Between 1940 and 1973, the price of stone increases negligibly, at an indexed rate of 2.8% per year. Beginning in 1973, the rate of increase is 19.5% per year. Before 1973, productivity gains held the stone rate below the rate of inflation. *(1980 NCSA)*



Since 1973, the rapid escalation in costs for energy—particularly oil products—explosives, and other items has undercut the industry's historic ability to achieve productivity gains. Even so, the rate of increase in the Stone Price Index is still far below that of the Consumer Price Index. *(1980 NCSA)*

1979-1981 period. That would be at least a 15% drop from the peak year to the bottom recession year.

Meanwhile, NCSA's most recent survey shows that operating costs nationwide will average an 8-10% increase in 1980. When the Consumer Price Index rises significantly—a sign of rapid inflation—the industry's production drops off rapidly while dollar value levels off or drops slightly. It's the bottom line that suffers. Return on investment in the aggregates industry will most certainly be down in 1980, 1981, and perhaps the first part of 1982 as a result of the ever-increasing costs of energy and operations and the downturn in sales that has already taken hold. Total dollar sales will be down about 10% according to most producers, although some say more and a few say less.

There are reasons for this situation. Stone prices remained stable between 1940 and 1973 because a dramatic increase in productivity, in combination with a low rate of inflation, resulted in a "real" decrease in the cost of producing stone and hence in the small growth in consumer prices for stone products. For 33 years after 1940, the price per ton of stone increased minimally at an indexed rate of 2.8% per year.

In the last half of the 1970s, inflationary pressures have caught up with the aggregates industry. Government monetary policies, regulations, and intervention have led to a levelling-off of productivity gains and, in fact, to a decrease in productivity per man-hour. This has had the effect of escalating stone prices, particularly in the last 5 to 10 years. In just the 6 years following the 1973 Arab oil embargo, the industry's prices have increased at an indexed rate of 19.5% per year! Nonetheless, stone prices have risen at half the rate of the overall Consumer Price Index. In "real dollars," stone is a better "buy" today than it was 40 years ago.

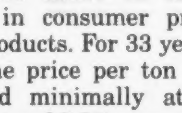
So what are stone producers doing about the recession? Industry-wide, the time afforded by the recession is being used wisely. Producers are taking the standard measures of laying off least tenured workers, shortening the work week, and eliminating overtime. At the same time, everyone is making productivity his criterion for evaluating operations, planning, and looking into new markets. Filling orders has seldom been a problem for the industry. But now, the importance of aiming at the right markets—ones in which there is demand or new ones in which there is potential—is being recognized and acted on. This too is an essential but often overlooked aspect of productivity. In other words, it is not productive to equip for and stockpile materials for which there is no immediate market; overproduction is not productive, especially when it may mean missing opportunities in other markets.

Streamlining operations by matching the right equipment with the appropriate job and by maintaining equipment has become a priority. For example, having the right number of trucks so that each is fully utilized is another small but important part of overall productivity. More and more producers are now examining computers to see how computer capability can make bookkeeping more efficient and thereby eliminate capital waste and bad debts, to see how computers can be used to monitor and evaluate energy consumption, to schedule start-up of operations efficiently, and to see how minicomputers can be used in management decision-making such as evaluating product lines and market demand, operating costs, and product pricing structures.

There are many seemingly minor components in productivity improvement, so many in fact, that they are frequently overlooked while we strive to find the one big answer to the productivity question. NCSA knows there is no one big question, only questions, and there is no one answer, only many little ideas which, when put to work together, may be able to resolve some of the bigger problems.

Throughout 1980, NCSA's Operations Division has taken the lead in re-focusing the industry's attention on basics: the specific ways by which more stone can be produced, markets penetrated, and return-on-investment increased.

LIMESTONE INDUSTRY HOPEFUL



Robert M. Koch
President
National Limestone Institute

Anyone attempting to prognosticate the year 1981 cannot help but be in trouble right from the word "go." There are two certainties, however—(1) economically, things can't become much worse than in 1980, and (2) for the first time in almost 30 years, business has the opportunity to work more closely with Congress and the Administration to influence new policy and reroute old.

As much as many have been grabbing headlines recently with talk about prayer in schools, abortion, and the like, the key issues of performance for the new government will be in the areas of the economy and regulatory reform.

1980 taught us that textbook economics is not always necessarily valid; much creativity, sensitivity, and *consistency* will have to go into formulating policies to spur on economic upturns—without the threat of continued inflation. In that regard, a tax cut will be forthcoming in 1981—but not necessarily as large as previous campaign rhetoric would indicate—and much will be done toward freeing business from a tax structure that discourages increased productivity and investment including consideration and likely passage of sub-minimum wage. The key to the nuts-and-bolts features of bettering the economy, however, will be the "perception" left in the minds of the financial, business, and consumer communities. If these sectors can be convinced the worst is over, the upturn will begin and should be strong throughout the remainder of the year. A false start, however, could spook many and cause the independent Federal Reserve to continue tough monetary policies and/or credit controls; this will only aggravate the current slump in construction.

True relief in the regulatory area will not be hard to obtain—if the need is clearly demonstrated and its importance is such that the political bounce-back is judged worth the action. No one should be fooled into thinking that either the Congress or the new Reagan Administration will fall into "knee-jerk" reactions to business requests. Our proposals will have to be well-thought out and defensible as good public policy. If it is for only short-term gains, we can bet that future elections will wipe out whatever opportunities business has in the coming 2 years.

As far as the limestone industry is concerned, topping our regulatory agenda will be MSHA reform legislation. NLI's approach in the past has been the education of Congress to the unworkability of many areas of the Mine Safety and Health Act and the building of a record on which meaningful legislative reform can go forward. NLI will propose several key points to the Congress early in 1981 for amendments to the Mine Act. Even if the 1980 elections had gone a different direction, 1981 still would have been the year of MSHA legislative reform—the elections have simply created a more conducive climate in which to work—particularly in regard to the Senate. The Congress will move early on reform legislation, but final enactment may not come until much later in 1981. But the seeds have been sown, and we believe the entire industry will be rewarded for its past patience, in the face of the extreme adversity of the Act, with changes that not only will get the government off an operator's back, but make a tripartite approach to safety and health—government/operator/employee—possible for the first time.

There will be those who attempt to frustrate the industry's drive for amendments to MSHA, but the record is clear and supports the kind of changes the industry wants made.

Of equal importance to MSHA is the reauthorization and rededication of the federal-aid highway program and its funding mechanism, the Highway Trust Fund. Many fundamental questions will be asked about the program by Congress; the answers they are given will set the program's tone and direction for the next decade. As the Interstate System plods toward completion, emphasis will shift to protecting the "trillion dollar investment" we now have in primary, secondary, rural, and urban systems—the heart of most local and state economies—through rehabilitation, resurfacing, *and* reconstruction. Only by acting now to slow the deterioration of these roads can we be sure that future needs won't completely outstrip future ability to pay. To fund all this, Congress will enact—safely away from any immediate election and after trimming individual and corporate taxes early in the year—an increase in the federal gas tax and key it to future growth as inflation and prices rise.

Although I would expect the federal matching ratio to also rise, the real problem in translating any increased federal funding commitments into increased aggregate *use* in construction will persist i.e. the inability of states to match federal funding. Although the total answer to this problem cannot be provided by the federal government, it is a question we will be asking repeatedly to find at least a partial solution.

Expect a new push for coal use—through making it financially more attractive than imported oil and by amendments to the Clean Air Act (up for reauthorization in 1981) as the environmental pendulum continues to swing back into balance. And with increased coal use, the use of limestone increases as a key tool for air quality (fluidized-bed, low-NO_x burning, and scrubbers). A surge in markets for this use will not happen in 1981, but it will bring the industry a step closer.

The aglime market will depend heavily, as in past years, on the farmer's disposable income and his judgment as to how much to commit to a total soil program. Aglime promotion should continue to hammer home the investment nature of the use of aglime and its availability at reasonable prices. With all the vagaries in weather, government set-asides, and conservation programs, aglime use should continue, nonetheless, in an upward trend as past users become yearly users and they're convinced of the commodity's significant contribution to production and soil conservation.

Prospects for federal reclamation legislation will fade in the face of the National Academy of Science's report and an anti-regulatory-minded Congress. Severe economic threats to the industry for increased water and air quality controls will have to be watched, but are not likely to be seriously considered by Congress.

Generally speaking, people have a good feeling about the coming year, despite continuing storm clouds on the horizon—continued domestic oil decontrol, possible sharp rises in foreign oil prices, and other "outside" pressures that could hinder efforts at home. And this "good feeling" will create, if bolstered early on by concrete developments, a new climate in the country that is good for business. Limestone is a basic commodity, and, though there may continue to be pockets of the country where use will decline, overall use should continue on the increase. Prices also will increase to meet the ever increasing costs of overhead over the past 5 years and at present. But overall, the industry will continue to rely on smaller local and state projects—particularly where states have budgetary surpluses that can be channeled to construction—and patiently wait for the construction economy to turn around to the kind of growth seen in the late 70s.

GYPSUM INDUSTRY EXPECTS PROGRESS

A. Victor Abnee, Jr.
Executive Vice President
Gypsum Association

Last year at this time, I was more optimistic than many of the contractor groups concerning the health of the construction industry, particularly in relation to housing starts, Time has proved me to be right and that is always most gratifying. I predicted that 1980 housing starts would not fall off nearly as drastically as some people anticipated—that is, to 1 million or even less. As this summary is being prepared, housing starts are only slightly below 1.5 million. I also anticipated that final 1979 figures would show a record gypsum board production of somewhere around 16.5 billion sq. ft. The final figure was a record 16.8 billion sq. ft.

Even with a better than average track record in reading crystal balls, projections, particularly short range projections, do not come easily. Housing starts have been showing great strength up to now in the face of higher mortgage rates; however, the sharply increasing rates of November and December have somewhat tempered industry optimism over the short range. I still do not think the final figure for 1980 housing starts will dip to the 1 million level predicted by others, but I do think the rise in starts during 1981 may be gradual—around 1.6 million, building up to around 2 million a year for the balance of the '80s.

1980 was a different story. Gypsum production was down compared with 1979. It looks now as if production for 1980 will total something over 14 billion sq. ft. Industry statistics indicate production levels will be about 12% to 15% below last year. March 1980 was the really low point for gypsum. Demand for gypsum wallboard fell substantially. Industry production figures have substantially improved from that point to the present.

Even with that low, however, gypsum use did not drop in direct proportion to reduced housing starts. The reason for this is an increasing use of gypsum in key markets.

Gypsum assemblies continue to be more widely used as lightweight elevator shaft walls, stairwells, and ducts in high rise buildings. Demountable gypsum partitions also are appearing more widely in offices and other commercial buildings. This means that more gypsum assemblies are specified each year in non-housing construction. This trend should continue throughout the 1980s.

I also would expect mobile homes to be an important expanding market for the industry. Gypsum drywall has, for some time, been used around furnaces, water heaters, and kitchen ranges—those areas demanding greater fire resistance. The industry feels fire safety considerations should lead soon to the much wider use of fire resistant gypsum board as interior walls and ceilings. A number of mobile home manufacturers already are producing or planning to produce homes with 100% gypsum drywall interiors.

This should, therefore, become a major gypsum market. With the cost of a home currently averaging $65,855, more people than ever will be drawn into the mobile home market or will be looking at another alternative—renovating older homes.

Remodeling and renovating should be a huge market for the balance of this decade. At the present time it is estimated sales of building products to the do-it-yourself market total $37 billion. More homes, apartments, and commercial buildings are being renovated and remodeled today than at any time in the past; this is a pattern I see continuing for the rest of this decade. These projects will use a variety of gypsum board products and assemblies. These diversified uses of gypsum products explain why our industry is not totally dependent on the housing curve.

Another important factor to be considered, when looking at the immediate future of construction, is the significant difference between the recession of 1974-75 and the slump of 1980. This time building contractors were smarter; they were not caught with a substantial inventory on their hands. When the upturn began after the 1974-75 recession, these inventories had to be depleted before new construction could be marketed. This does not appear to have happened in the aftermath of the 1980 recession.

Although generally optimistic

for the long range, I must point out again that, as this paper is being prepared, housing sales and permits are dropping, a fact that will temporarily bring down housing starts.

But, in the long-run, we find encouragement in the assessment of the Federal National Mortgage Association (Fannie Mae): "Regardless of whether money is tight or easy, interest rates high or low, the demand for home financing will be increasing. The babies born during the post-war boom are ready for places of their own. Nearly 32 million Americans reached 30 years of age during the '70s. During the '80s, 42 million will reach the prime buying age."

This analysis goes on to say, "Additional demands for mortgage funds will come from some new buyers in the housing market, women who head households, the elderly, and single people, for examples. Minorities who had found opportunities scarce or nonexistent now have the protection of the law to help them enjoy home ownership."

George A. Christie, chief economist for McGraw-Hill Information Systems Co., sums the situation up when he says, "Together, the combination of pent-up demand, a tight housing supply, and considerably improved mortgage market operations suggest an even more vigorous housing recovery in 1981 than in 1976." However, he is quick to point out that continued inflation could impose formidable limits on this expansion since it has a two-fold negative effect in the form of higher building costs and higher credit costs.

For the gypsum industry, I can say that industry production capability is now at an all-time high, resulting undoubtedly from the fact that the industry anticipates some record production years during the balance of the 80s.

SLAG INDUSTRY HOPEFUL ABOUT '81

H. K. Eggleston
Managing Director
National Slag Association

The slag industry is optimistic for 1981 due to two factors: 1, an increase (over 1980) in steel production, the source of slag; and 2, increased use of improved processing equipment and techniques which should increase the volumes of slag used for several specialized purposes.

The production of iron and steel is critical to the slag industry because most of the reserves of "old" slag have been exhausted. The slag industry is directly dependent upon the steel industry for its raw material. Steel production was relatively low in 1980 but the prospects for 1981 are good—no changes in iron and steel production techniques which will affect the percent of slag per ton of hot metal are expected.

However, the principal reason for optimism results from developments in processing techniques and the potential of steel industry slag for reducing energy requirements.

Several years ago, a device was developed which could expand liquid slag as it flowed from the blast furnace to produce a lightweight aggregate. Continued use of this equipment has resulted in improvements which now permit the production of material suitable for several high quality uses.

One of these, with great potential for energy conservation, is the use of blast furnace slag as a substitute for portland cement, eliminating the use of energy to create the clinker needed for portland cement. Slag has been used for this purpose for many years in Europe, Japan, South Africa, and the Communist countries providing proof of the reliability of slag for this purpose; but use of slag as a cementitious material has not been a common practice in the United States.

Water-granulated (large volumes of water to quickly quench the slag) has been a generally accepted method for producing a slag with suitable characteristics for cement. It requires a high capital investment. The ability of the new processing device to mechanically break up molten slag into small particles permits the required rapid quenching of the slag with smaller volumes of water and smaller capital investment. Thus, there are two options for producing slag for cement, and this, combined with the energy saving from eliminating the kiln calcining of clinker, should result in a much greater use of slag for cement in the coming years.

The increased flexibility of expanding devices also permits the production of lightweight aggregate for a variety of construction purposes—from use in concrete to lightweight base material in poor soil conditions. Included in this range are substitutes for expanded clays or shales which require large expenditures of expensive energy.

Steel and blast furnace slags continue to demonstrate in actual use that they can provide long-lived high skid resistance for highway resurfacing. It is anticipated that there will be an increase in the number of instances where slag will be required for this purpose.

Thus, even though there will only be a modest increase in the availability of slag, there should be a significant increase in the sophistication of uses made of steel industry slags.

LIGHTWEIGHT AGGREGATE REFLECTS RESIDENTIAL CONSTRUCTION

T. R. Berger
Executive Director
Lightweight Aggregate
Producers Association

For lightweight aggregate, 1980 proved to be a year of stable but not spectacular sales volume. The year began on a fairly upbeat note but softened in the third and fourth quarters as construction activity slackened due to continuing inflationary pressures, an uncertain economy, and higher money costs.

Close to 90% of all lightweight aggregate production is going into the manufacture of masonry units so any downturn in residential construction has an adverse effect. Activity in this category was slower than in industrial and commercial building. Specialized uses of lightweight aggregate—as an admixture for potting soils and other applications in agronomy, or for running tracks—are thriving. Nevertheless, the fundamental market for our product is masonry units, precast and prestress concrete, structural concrete, refractory concrete, et al. And 1980 was not an exceptionally busy year in most geographical areas of the nation in these industries.

The cost of producing lightweight aggregate is tied closely to the spiraling expenses of fuel, equipment replacement, maintenance, and—not the least of all—environmental controls. There has been less attrition in the number of lightweight aggregate plants, but, in many sections of the country, the demand simply cannot be met because production facilities have suspended or closed out altogether under the hammer blows of uncontrolled inflation and complex, costly environmental regulation.

Despite this, several producers are expanding or are planning to enlarge production facilities, albeit with some misgivings about the wisdom of their increased capital investment. Such confidence and courage is to be commended. This commitment demonstrates their strong feelings that the place of lightweight aggregate in today's times and in the future is assured.

One of the significant indicators that holds great promise for a brighter tomorrow is the key role lightweight aggregates are fulfilling with respect to new energy saving construction techniques and building code requirements set forth by HUD and other regulatory agencies. For example, lightweight aggregate is ideally adapted to the standards specified in new construction concerning insulation. It also is finding favor with architects and builders in its application to the concrete construction of underground housing, particularly with respect to condensation and moisture effects and the development of designs to cover these factors efficiently.

The industry looks at 1981 with cautious optimism. If there is an upsurge in the health and vitality of the construction industry and the general economy, lightweight aggregate will benefit. It's that simple.

EXPANDED SHALE IMPROVES EFFICIENCY

Harry C. Robinson
Managing Director
Expanded Shale Clay
and Slate Institute

Expanded shale clay and slate by the rotary kiln process is used in all phases of construction as well as for a few very unusual special uses. Approximately 65% is used in the manufacture of concrete masonry units; 20% is used in the structural field—ready mixed, precast and prestressed concrete; 10% is used in flexible pavement; and 5% goes for special uses.

Due to high interest rates, inflation, and the general recession, the expanded shale industry has felt an approximate 18% decline for 1980. Even though this reduction hurts the overall operation of the industry, producers have still been very conscious of improving production efficiency in order to hold down energy costs.

Industry members are hopeful that the new administration taking office in January will bolster confidence in the economy in 1981. The continued high interest rate will keep housing starts down in the first quarter but we look for an up-turn as spring breaks.

Efficient use of energy will

continue to be most important to everyone. The solar home will not be the home of the future but the home of today. Heating homes and businesses with passive solar energy will become more popular and this is where our industry will make a strong contribution. Lightweight concrete and masonry are excellent passive solar energy collectors and will give an efficient but low cost solar home or industrial building. This will trigger more use of concrete and masonry, therefore more use of lightweight aggregate. The overall use of lightweight concrete and masonry also will help reduce the cost of energy use. ESCSI members predict that we will gain back that 18% decline in 1981. With extra promotional effort, we may even go another few percentage points beyond that.

LIME TAKES A NOSE DIVE IN 1980

Kenneth A. Gutschick
Vice President & Technical Director
National Lime Association

After 4 years of steady growth, including records set during the last 2 years, commercial lime (quick & hydrate) plunged drastically in 1980, dropping an estimated 11% below 1979. The decline was even greater during the first 9 months—off 13% from the comparable period in 1979, but an upturn in the last quarter should bring yearly sales to 12.7 million tons. This will be the lowest since 1975, the country's previous recession year.

Captive lime and dead-burned dolomite, which are included in the U.S. Bureau of Mines' Survey on lime, also declined in 1980, but at slightly higher percentages than commercial lime. Accordingly, it is expected that total lime output in 1980 will approximate 18.2 million tons, off 13% from last year. Apparent lime consumption in the United States, which includes U.S. output plus imports minus exports, should total only 18.8 million tons, or 14% below 1979. The reason for the greater percentage decline is that imports (chiefly from Canada) are expected to drop 30% from last year's record high of 640,000 tons, while exports will remain at about the 45,000 ton level.

The principal reason for the depressed lime market in 1980 can be traced directly to the sagging automobile and housing industries which caused the steel industry to have its worst year since 1975 (second lowest since 1971). For the first three quarters, production of raw steel, which accounts for nearly 45% of total lime output, was off a gigantic 22% from last year, with the steel mills operating at an unbelievably low rate of 50% of capacity during part of the summer months. This poor performance by steel resulted in a 27% decline in fluxing lime sales for the first three quarters.

The depressed construction market, particularly housing, naturally affected sales of building lime (masons and finishing) which were down 11% through September. On the bright side, however, stabilization lime shipments were up 8%, undoubtedly due to brisk construction activity in the Sun Belt states, particularly Texas, where lime stabilization has become a standard construction practice in the highly plastic clay areas. There also is renewed interest for lime in maintenance, particularly for stabilizing worn-out pavements where in-place materials are salvaged, with only a small percentage of lime being needed for stabilization.

The remaining major lime uses—chemical and environmental—were about the same as in 1979 with gains in treatment of water, sewage and industrial wastes, and scrubbing SO_2 from stack gases, offsetting losses in lime manufacture of glass, aluminum, copper, pulp and paper, etc. The scrubbing market has recently become a major use with sales exceeding 600,000 tons in 1979, probably higher this year.

Lime shipments fluctuated considerably in 1980. During the first 4 months, sales closely paralleled the previous record year of 1979. But in May, output plunged drastically, with the summer months falling to 5-year lows. In September, however, the upturn began (up 6% over August), and is continuing into the fourth quarter.

In 1981, we expect a much improved year for lime, particularly during the second half; we anticipate a gain of perhaps 8-10%. The new Reagan administration should provide a much needed shot-in-the-arm for business and industry, principally by providing a better business climate (less government regulations, reduced inflation, greater incentives for plant expansion and modernization, greater opportunities for increased productivity, etc.). The main deterrent, however, at least initially, is the rising prime lending rate, which is temporarily slowing recovery from the 1980 recession. Rapidly rising interest rates are curtailing purchases of automobiles, housing, and other major items, as well as causing delays in much needed expansion of plant facilities. This trend must be reversed soon or the recession will continue on into late 1981.

Aggregates, other major nonmeta

Cloudy 1980 picture brightens for 1981

BY SANDY HEROD
and
SID LEVINE

Information presented in the following section on the sand and gravel, crushed stone, and lightweight aggregate industries is based on data submitted in response to our annual Pit & Quarry survey of producers of those commodities. The canvass has been conducted during the final quarter of each year since 1955.

Production levels have been reviewed regularly, but, through the years, questions have been added relative to pricing levels, certain cost centers, and regulatory factors in order to also establish patterns, trends, and impact on the industries of these factors.

The survey questionnaire also asks producers about their business prospects and any plans they may have for new plants, equipment replacement, or expansion projects. Their responses provide a solid base from which the outlook for the coming year may be studied.

Data derived in tabulating and recapping the information submitted are summarized in an accompanying table. Since these surveys are conducted early in the fourth quarter, producers are asked to make full-year estimates for some factors.

Information provided by each individual is kept confidential; the data are incorporated in the tabulation of the total response by region. On some questions, weighted national averages are established.

In preceding pages of our outlook and review, industry production figures provided by national associations will be higher than those indicated in this section. This is because we survey only *aggregate* producers for this part of our review; we do not include tonnage of crushed stone, sand and gravel, etc. used in cement and lime manufacture, agricultural material, glass manufacture, foundries, and similar customer industries.

At this time last year, our projection of survey data pointed to a further increase in aggregate production during 1979 over the 1978 level. Our latest survey, and the most recent government commodity reports, indicate a gain in the total of all aggregates produced although a slight drop was recorded in one category.

The combined production (aggregates only) of sand and gravel, crushed stone, and slag (exclusive of expanded slag) totalled slightly more than 1.8 billion tons or about 1% above 1978. The sand and gravel and slag tonnage portions of the total were down slightly from the preceding year, but crushed stone showed a gain of nearly 5%.

Lightweight aggregate tonnage was down to 12.6 million tons from the 13.3 million produced in 1978. This reflects shutdowns and other production interruptions arising from the problems a substantial number of the lightweight producers—particularly in the case of expanded clay and shale and expanded slag—have faced in at-

Summary of Pit & Quarry's 1980 Aggregate Survey

	Sand & Gravel	Crushed Stone	Lightweight Aggregate
Review of 1980			
Product (+ or − vs. 1979)	− 6%	− 2%	− 3%
Prices			
raised (% of replies)	88%	72%	87%
avg. % raised (weighted)	8%	10%	11%
Wages			
raised (% of replies)	92%	87%	83%
avg. % raised (weighted)	12%	9%	11%
Maintenance costs			
up (% of replies)	85%	81%	76%
avg. % of increase (weighted)	15%	16%	17%
Outlook for 1981			
Expect gain (% of replies)	50%	31%	61%
avg. gain expected (weighted)	+ 11%	+ 16%	+ 12%
Expect decrease (% of replies)	10%	19%	4%
avg. drop expected (weighted)	− 9%	− 19%	− 10%
No change (% of replies)	22%	37%	22%
Unsure (% of replies)	14%	9%	8%
Plans reported (% of replies)			
New plants	12%	12%	8%
Equipment replacement	22%	25%	17%
Plant expansion	14%	15%	13%

This table summarizes various major factors reviewed in Pit & Quarry's annual survey of aggregate producers excepting slag which is discussed in an accompanying association commentary. As applicable, the figures indicate percent of change.

tempting to conform with air quality control standards.

The data provided by respondents to our latest survey point to a drop in sand and gravel output during 1980 and a level of crushed stone production about the same, or slightly lower, than in the preceding year. Iron and steel slag material (not expanded) also was down. However, of standard weight aggregates, combined production appears to have been only about 5% lower than in 1979. As a group, lightweight materials apparently continued the decline, first appearing in 1979, and were down on the order of 6%.

In recapping our latest survey, we arrive at an estimated production of sand and gravel aggregates in 1980 of 945 million tons, an output of crushed stone remaining at the 860 million ton level, a slag processing rate of 33 million tons, and a combined output of all types of lightweight aggregates of about 12.2 million tons.

With respect to prospects for the coming year, a substantially larger number of respondents to our latest survey were optimistic about business in 1981 than was the case, relative to 1980, a year ago. Interestingly, as the table shows, lightweight aggregate producers were in the vanguard of the optimists.

Immediately following the review and outlook data compiled from our survey of sand and gravel, crushed stone, and lightweight aggregates are the latest figures available (1979 and partial 1980) on other major nonmetallic industries. Included are lime, agstone, gypsum, phosphate rock, potash, barite, talc, feldspar, and fluorspar.

Sand and gravel

The growth projected for the full year of 1979 by respondents to our survey a year ago overshot the mark by a small percentage. According to the final Bureau of Mines Mineral Industry report for that year, the total tonnage of construction aggregates for 1979 was about 945.5 million tons, valued at some $2.1 billion—a drop of 2% in volume but a 5% gain in value.

Our latest survey indicates that, at best, production did not decline precipitately; final data for the year probably will show an output on the order of 900 million tons.

However, optimism for the coming year is evident in the fact that 50% of our respondents look for considerable improvement. Their numbers are 25% higher than was the case a year ago.

There are no surprises found in the producers' replies to questions concerning certain operating expenses. As shown in the summary table, the weighted national average increase in wage costs for each industry was substantial. The 12% climb reported by sand and gravel producers is nearly one-third higher than in the preceding year.

Further, maintenance costs continue to climb each year. The 15% national average increase in 1980 is about the same rate of gain reported a year ago. Parts availability, aside from rising costs of these components, is one of the most frequently cited problems.

In the face of appreciable increases in both of the above major cost centers, we find that, while the majority of respondents raised prices of their products again last year, the increases were at a much lower rate. The weighted national average of 8% was from 30 to 50% less than the climbs in wage and maintenance expenses.

Outlook

Nearly 25% more respondents look for an upturn in their business during 1981 than were in the optimistic group a year ago. Fully one-half hold that opinion; the average increase expected (weighted nationally) is 11%.

Further, another 22% of our replies (nearly one-half of the remainder of the respondents) indicate the feeling that the coming year will hold at the same level as the 12 month period just past. Just 10% of the replies pointed to a decline.

Considering the projected picture for construction, described elsewhere in this outlook and review section, we feel the industry will record a slow climb during the coming year, perhaps reaching the level of nearly 940 million tons.

Crushed stone

Last January, in reporting on our survey covering 1979, we predicted a production volume of crushed stone aggregates on the order of 859 million tons. At 858 million tons, valued at $2.5 billion, final Bureau of Mines figures corroborate the estimate made on the basis of returns from our survey.

During 1980, according to the full-year estimates supplied by respondents to our latest canvass, output remained at apparently the same level. If final figures show a decline, it very probably will be of less than 2%.

With respect to the coming year, we find that about one-third of the answering producers look for an upward turn; a slightly larger number feel that production will remain at the 1980 level.

The major cost centers of wages and maintenance continued steep climbs in 1980; respective increases of 9% and 16% are virtually the same as reported for 1979.

While a number of various maintenance problem areas were cited on questionnaires returned, ranging from bearings to poor performance of maintenance personnel, far and away the most frequently noted problems concerned parts availability (and service) and crushers (primarily wear components).

Our survey respondents also reported boosts in their prices. The weighted national average increase of 10% was identical to that indicated for 1979. However, it was less than the percent of increase in maintenance costs and was about equal to that of labor costs.

Outlook

As noted earlier, and indicated in the summary table, just over two-thirds of the crushed stone survey replies indicate anticipated increases in business during 1981 or at least the same level reported for 1980. A decline during 1981 is anticipated by 19% of their colleagues. This group is only slightly smaller than that which held a similar opinion a year ago with respect to 1980. However, they look for a sharper (19%) decline.

Considering the relationship of prime rates and inflation to construction activity, it would not be realistic to expect a surge in the industry's output during the coming months. However, the projected gain of about 3-4% in physical volume of construction could readily result in an output of about 865 million tons of crushed stone aggregates in 1981.

Lightweight aggregates

The estimates of full-year production in 1979 supplied to us by our respondents a year ago pointed to a nominal increase of less than 1% in output over the previous year.

However, the final government figures for 1979 reflect a decline of 6% in the combined production of expanded clay, shale, and slate; of pumice, expanded slag, expanded perlite and exfoliated vermiculite. The total was 12.5 million tons.

Our 1980 survey returns report a continued decline last year, although at an average of 3% for all lightweights combined, the drop was at a lower rate than the preceding year; estimated production was about 12.2 million tons.

The problems faced by producers of this type of aggregate—the cost and availability of fuel involved in processing of most, along with the expense of equipment and downtime experienced in programs set up to meet air quality regulations—has been cited in survey reports of recent years.

As a group, the lightweight aggregates show cost center trends that are within one or two percentage points of those displayed in the standard weight aggregate industries. Also the rates of increase in cost elements, as well as pricing, are virtually identical to those reported a year ago for 1979 (see summary table).

Outlook

While lightweight producers have had problems that, along with the current economic situation, understandably could generate considerable pessimism, they, nevertheless, have taken the opposite position in greater numbers than standard weight aggregate producers.

In fact, the number of respondents anticipating an upturn in their business this year is nearly double that of a year ago. Almost two-thirds look for a turnabout, nearly one-quarter feel conditions will not deteriorate further, and, together, they far outnumber the 4% of respondents who feel the decline will continue in 1981.

The optimism is refreshing, but probably needs a little tempering in light of still unresolved inflation and prime rate factors. Accordingly, we feel that, while an improvement over last year is probable, the rate will be lower than the producers project and will result in production in the neighborhood of 12.6 million tons during 1981.

Agstone

According to the latest figures available, obtained in a state-by-state survey by a national industry association, application of agricultural limestone in 1979 rose to 30.1 million tons, an increase of about 1% over 1978. That made the fifth consecutive year that agstone usage on the nation's farms and other soil conservation projects was at a level above 30 million tons.

That figure still represents less than one-third of the annual tonnage needed, as determined by agronomists. Missouri farms used 4 million tons in 1979, and applications in Illinois amounted to 3.5 million--these two leading consumer states accounting for about 25% of the total tonnage used in the 42 states surveyed.

Lime

Lime output by U.S. producers totaled 20.9 million short tons valued at $862.4 million in 1979 and 20.4 millon tons valued at $749.6 million in 1978. Puerto Rico provided an additional 41,000 tons with a value of $3.2 million in 1979 and 37,000 tons with a value of $3.3 million in 1978. Preliminary data for lime sold or used by U.S. and Puerto Rican producers in 1980 give an estimate of 18.1 million tons. The record output was 21.6 million tons in 1974.

By lime type, production percentages in 1979 were: quicklime, 83.8%; hydrated lime, 12.4%; dead-burned dolomite, 3.8%. By use groups in 1979, agriculture accounted for .34% ($3.2 million value); construction, 6.4% ($62.8 million value); chemical and industrial applications, 89.4% ($757.9 million value); refractory dolomite, 3.7% ($41.6 million value).

A total of 485 kilns were operational during 1979: 248 vertical kilns; 181 rotary kilns; 27 pot kilns (primitive vertical); six fluidized-bed kilns; four Ellernan kilns; one traveling-grate rotary kiln. Hydrators for the production of hydrate lime totaled 118 during 1979; 23 were of the batch type and 95 were of the continuous type.

Gypsum

In 1979, 42 companies mined crude gypsum at 65 mines in 22 states for a total of 14.6 million short tons valued at $99.8 million. Output decreased 2% compared with the record year of 1978. Imports of crude gypsum increased 17% in 1978 to a record 8.3 million tons, but decreased 6% in 1979 to 7.8 million tons.

Production of calcined gypsum increased 12% to 14 million tons (value, $387 million) in 1978. An increase of 4% in 1979 set a new annual record of 14.6 million tons ($442.1 million). Sales of gypsum products in 1978 amounted to 21.6 million tons (value, $1.25 billion) and 21.8 million tons (value, $1.39 billion) in 1979.

Of the total gypsum products sold or used in 1979, 5.8 million tons (37%) were uncalcined. Of the total uncalcined gypsum, 4 million tons (69%) were used for portland cement, 1.7 million tons (29%) for agriculture, and the remaining 2% for fillers and miscellaneous uses.

Of the total calcined gypsum in 1979, 95% was used for prefabricated products and 5% for industrial and building plasters. Of the prefabricated products, 75% was regular wallboard, 19% was fire-resistant Type X wallboard, 3% was veneer base, and sheathing and predecorated wallboard were 1% each. Demand for gypsum is expeted to increase at an annual rate of about 2.7% through 1985.

Phosphate rock

Mine production of phosphate rock in the United States amounted to 173.4 million metric tons in 1978 and 185.7 million metric tons in 1979. Record tonnages of 50 and 51.6 million metric tons of marketable phosphate rock were produced in 1978 and 1979, respectively. Values of marketable production were $928.8 million in 1978 and $1,045.66 million in 1979.

In 1978, Florida and North Carolina produced 87% of the total marketable phosphate rock; the western states produced 10%; Tennessee produced 3%. In 1979, Florida and North Carolina produced 86%; the western states, 11%; Tennessee, 3%.

The principal domestic markets for phosphate rock in 1979 were: fertilizers and animal feed supplements, 88%; and industrial and food grade products, 12%. Uses of the 38.7 million metric tons of marketable phosphate sold or used domestically in 1979 by U.S. producers were: wet process phosphoric acid, 81.8%; normal superphosphate, .8%; triple superphosphate, 4.3%; defluorinated rock, .6%; direct applications, .1%; elemental phosphorus, 11.8%; ferrophosphorus, .6%.

Potash

U.S. potash production in 1979 amounted to 4.2 million metric tons (2.2 million metric tons K_2O equivalent). Imports for consumption in 1979 totaled 8.51 million metric tons (5.17 million metric tons K_2O equivalent), valued at $520.8 million. Exports amounted to 1.12 million metric tons (.635 million metric tons K_2O equivalent), valued at $79.5 million.

Apparent consumption in 1979 totaled 11.9 million metric tons (6.9 million metric tons K_2O equivalent). Sales by producers in 1979 amounted to 4.55 million metric tons (2.39 million metric tons K_2O equivalent), valued at $279.2 million.

In 1979, 82% of all production was potassium chloride and 9% was potassium sulfate. The remaining were manure salts and potassium magnesium sulfate. New Mexico accounted for 84% of total domestic production in 1979.

Barite

U.S. mine production of barite ($BaSO_4$) sold or used amounted to 2 million short tons (valued at $51.75 million) in 1979, about 4% less than the 1978 record. Imports totaled a record 1.49 million tons (valued at $64.07 million), and exports were 109 million tons (valued at $10.8 million).

Total ground and crushed barite sold or used by producers reached a record 3 million tons (valued at $168.1 million), 12% higher than the previous record set in 1978. The principal use for barite, as a weighting agent in oil- and gas-well drilling muds, accounted for 94% of total sales, or 2.84 million tons. Other uses include barium chemicals and fillers.

Nevada is the leading producing state with 85% of total production. Other producing states (in descending order of production) were Arkansas, Missouri, Georgia, Montana, Illinois, Tennessee, and New Mexico.

Feldspar

Feldspar production amounted to 740,000 short tons, valued at $21.5 million in 1979. Seven states produced feldspar in 1979, including North Carolina, California, Oklahoma, and South Dakota.

Imports for consumption in 1979 amounted to 266 tons valued at $31,000, and exports totaled 12.3 tons with a value of $1 million. End-use distribution in 1979 was 55% for glassmaking, 42% for pottery, and 3% for such applications as enamels, soaps, sanitary ware, etc.

Fluorspar

U.S. fluorspar production segments for 1979 were: mine production, 407,054 short tons; material beneficiated, 355,655 tons; material recovered, 106,099 tons; finished shipments, 109,299 tons (valued at $12.16 million). Illinois was the leading producing state in 1979 accounting for almost 90% of all U.S. shipments.

Imports for consumption amounted to 1.02 million tons, valued at $80.1 million. The United States depended on imports to supply more than 85% of its fluorspar requirements in 1979. End-uses of the reported 1.136 million tons were: hydrofluoric acid, 51.8%; glass and fiberglass, 1%; enamel and pottery, .1%; welding rod coatings, .1%; primary aluminum and magnesium, .1%; iron and steel castings, 1%; open hearth furnaces, 7.9%; basic oxygen furnaces, 29.7%; electric furnaces, 7.9%; other uses, .5%.

Talc

Crude talc mined in the United States in 1979 amounted to 1.2 million short tons, valued at $19.3 million. Crude and processed talc sold by producers totaled 1.119 million tons, valued at $80.53 million.

Imports for consumption amounted to 22,000 tons, valued at $2.8 million and exports totaled 316,000 tons, valued at $15.2 million. Talc was produced at 36 mines in 12 states in 1979.

End-uses for ground talc in 1979 were: ceramics, 27.1%; cosmetics, 7.7%; insecticides, 1.4%; paint, 24.7%; paper, 10.9%; plastics, 11.7%; refractories, .6%; roofing, 2%; rubber, 4.1%; other uses, 9.8%. ●

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the international cement scene

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The international cement scene

Plant and production update: 1981

BY SID LEVINE

World cement production for 1979 is estimated at 860.5 million metric tons, just slightly higher than the 1978 record level. Although construction activity shows a diversified pattern geographically, the world economic trend indicates a drop-off in cement consumption for 1980.

Total 1979 production in the 19 country-members of the European Cement Association (CEMBUREAU) amounted to 212.7 million metric tons—a decline of about .7% over 1978. For the first time, cement production declined in the Soviet Union; output fell from 129.3 million to 123 million tons. Top exporters among the CEMBUREAU countries in 1979 were: Spain, 8.7 mmt; Greece, 4.9 mmt; France, 2.8 mmt; Great Britain, 1.4 mmt.

Leading Cement Producing Countries

(In million metric tons)

	Production	Total cement capacity (est.)	
	1978	1979	1980
U.S.S.R.	129.3	140.	N.A.
Japan	84.4	109.	N.A.
United States	72.5	91.5	95.
China	68.	N.A.	N.A.
Italy	38.5	50.	N.A.
Germany (West)	33.	35.	35.
Spain	32.1	39.9	44.
France	31.2	36.6	36.9
Brazil	23.2	27.	30.
Poland	21.7	N.A.	N.A.
India	19.6	22.8	26.5
United Kingdom	16.6	19.6	19.4
Korea (South)	15.5	20.3	23.3
Turkey	15.4	18.7	19.6
Mexico	15.3	16.9	19.5
Romania	14.	N.A.	N.A.

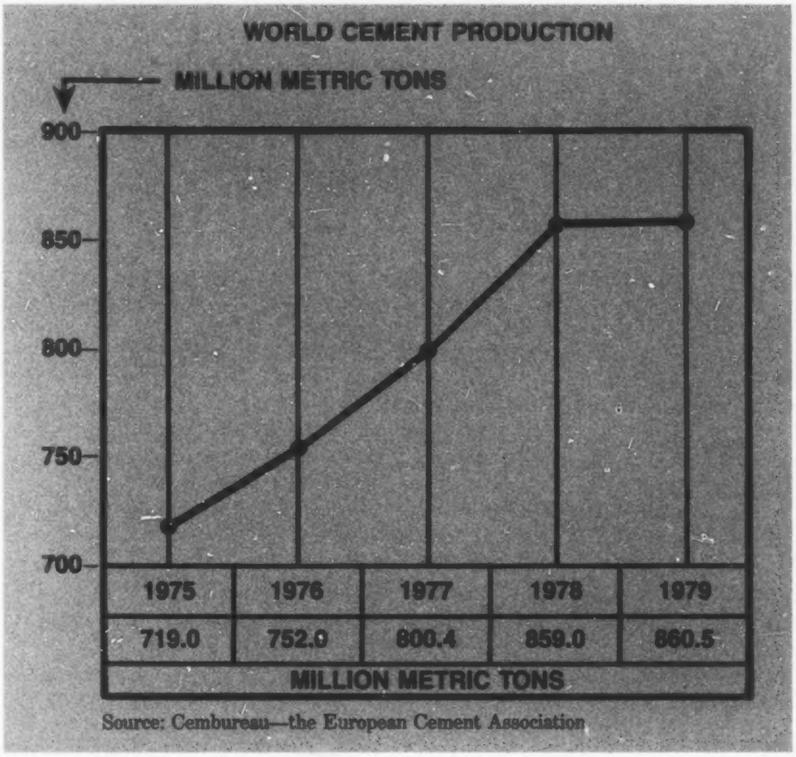
Sources: CEMBUREAU publications; "Mineral Commodity Summaries, 1980", U.S. Bureau of Mines; Pit & Quarry estimates.

New cement production units continue to be planned and built. In this annual survey, Pit & Quarry provides projected operational dates for new cement plants and plant modernizations and extensions, and lists projects placed onstream in 1979 and 1980. Where data were available, production quantities for the 1976-1978 period and estimated cement capacities for 1979 and 1980 are listed for the various countries.

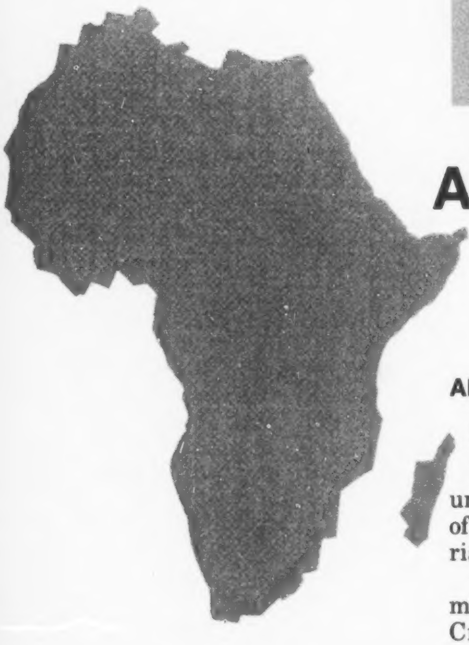
In July of 1980, the Mexican government announced expansion plans of its cement industry. The federal government's goal is to meet Mexico's domestic needs plus provide a 10% surplus for export. This would increase cement production 13.1 million metric tons in the 1980-1983 period.

In its 1979 annual report, Polysius has noted that cement plant production supply continues to exceed demand. The situation, the company says, is aggravated by the entrance of new suppliers into the market and by the fact that, in western Europe, engineering firms oriented toward serving the domestic market are having to find work from abroad to maintain employment.

The cost of energy continues to be a major problem for the cement industry. Polysius, in the same report, said this energy market has led to an exceptional level of business in the conversion of plants to coal use.



Source: Cembureau—the European Cement Association



AFRICA

Algeria

Cement production			Capacity	
1976	1977	1978	1979	1980
1.321	1.820	2.699	4.7	5.4

Quantities in million metric tons

Cement plants are state-owned under departmental jurisdiction of Societe Nationale des Materiaux de Construction.

- Beni-Saf. Capacity: 1 million mtpy. Major equipment supplier: Creusot-Loire Entreprises. Dry process plant with 1,200 tph crusher; 270 tph raw mill; two 90 tph finish mills; 18 ft. × 300 ft. rotary kiln. SNMC contract. Process control equipment: Comsip (France). Consulting engineers: Prospective Engineering Gestion. Scheduled onstream: 1979.
- Bouira. F. L. Smidth & Co., Denmark, and F. L. Smidth & Cie., France, will supply a turnkey cement plant with a 1 million tpy capacity. The plant will be located near Sour-El-Grhozlane in the Bouira district, about 140 km southeast of Algiers. Scheduled operation: 1983.
- El Asnam (250 km from Algiers). Capacity: 1 million mtpy. Onstream: 1979. Dry process, suspension preheater, computer controlled. Major equipment suppliers: Kawasaki Heavy Industries, Ltd. and Marubeni Corp. SNMC contract.
- Hamma-Bouziane (Constantine). Capacity: 1 million mtpy. Major equipment supplier:

Creusot-Loire Entreprises. Scheduled onstream: 1980.

- Saida (Oran). Capacity: 500,000 mtpy. Onstream: 1979. Dry process (preheater kiln). Major equipment supplier: Kawasaki Heavy Industries, Ltd. Consulting engineers: Lafarge Conseils et Etudes.

Angola

Cement production			Capacity	
1976	1977	1978	1979	1980
.150	.150	.170	1	1

Benin

Cement production			Capacity	
1976	1977	1978	1979	1980
.170	.170	.230	.4	.6

- Societe des Ciments d'Onigbolo: Onigbolo. Two neighboring West African states, the People's Republic of Benin and the Federal Republic of Nigeria, have jointly awarded F. L. Smidth & Co. A/S a contract for the construction of a cement plant with a capacity of 500,000 tpy.

The dry process plant will include a Tirax raw mill, 4.6m × 8.25m, with a 4.4m drying chamber, a 1,600 tpd oil-fired four stage preheater Unax kiln, 4.55 × 68m, and a Unidan cement mill, 3.8m × 12m. The project is under construction with completion expected in 1982.

- Societe Nationale des Ciments (SONACI): Cotonou: 200,000 mtpy open-circuit grinding plant scheduled onstream in 1979. Consulting engineers: Prospective Engineering Gestion. Main equipment supplier: Koch (Germany).

Cameroun

Cement production			Capacity	
1976	1977	1978	1979	1980
.303	.405	.417	.545	.570

- Cimenteries du Cameroun: Figuil. Expanding from 70,000 tpy to 100,000 tpy. Scheduled onstream in 1982.

- Cimenteries du Cameroun: Douala. Raising production capacity at the Bonaberi clinker crushing works from 480,000 to 870,000 tpy. Scheduled onstream: 1983.

Central African Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	.12	.12

- Fatima (near Bangui). Projected 120,000 tpy plant.

Congo Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
.045	.045	.060	.080	—

- The Congolese government is modernizing and expanding its existing Cidolou operations from 80,000 to 120,000 tpy. Project due for completion in 1983. Prospective Engineering Gestion (Switzerland) is acting as consultant and project manager.

Egypt, Arab Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
3.362	3.170	3.040	3.655	4.090

- Tourah Portland Cement Co.: Lecaire (Tourah). Adding 2,000 mtpd F. L. Smidth dry-process kiln equipped with cyclone preheater and a precalciner. Scheduled onstream: 1981.

- National Company for the Production of Cement: El-Tabbin (30 km south of Cairo). Adding 4,500 tpd production line. Major equipment suppliers are Humboldt Wedag and CGEE Alsthon S.A. Clinker will be produced in a 76m long × 5m diameter rotary kiln with a twin-type preheater and an additional in-line firing arrangement. Scheduled onstream: 1979. Dyckerhoff Zementwerke will supply consulting services.

- Alexandria Portland Cement Co. (Alexandria). Expansion, due onstream in 1979.

- Suez Cement Co., Eastern plant, south of Suez City: Building new 1 million mtpy plant. Fuller Co. supplying equipment, including 15 ft. × 42 ft. raw mill; SF-141 preheater with flash calciner; 15 ft. × 16 ft. × 240 ft. rotary kiln; two 15 ft. × 46 ft. finish mills; grate clinker cooler; blending and raw storage silos; Fuller-Kinyon systems; dust collectors; fluidizing gravity conveying systems. Ferguson International Co. is project manager and consultant. Participating are: Arab Consulting Engineers; Arab Swiss Engineering Co.; Bendy Engineering Co. (process review); Morrison-Knudsen (quarry, plant, and development); H. K. Ferguson, San Francisco Division (coordination of U.S. subcontractors, purchasing, expediting, construction estimate, and portion of engineering). Scheduled onstream: 1982.

- Suez Cement Co.: Second plant to be built in Quattamia (formerly East Maadi). Capacity: 1.4 million mtpy. Ferguson International Co. is the project manager and consultant. Participating are: Arab Swiss Engineering Co.; Bendy Engineering Co.; Arab Consulting Engineers; Morrison-Knudsen.

- Helwan Portland Cement Co. (Helwan): Consortium formed by F. L. Smidth & Co. (Denmark) and Brown, Boveri & Co. (Switzerland) awarded contract by company to convert two existing wet process production lines to dry process. Both lines will incorporate F. L. Smidth precalcining systems with four-stage preheater kilns. Capacity: 3 million mtpy. Scheduled onstream: 1981.

- Helwan Portland Cement Corp. (Assiut). A 1.5 million mtpy plant is being built by a European consortium headed by Polysius. Equipment will include: four-stage Dopol heat exchanger; Prepol AS precalciner; rotary kiln; two raw-mix grinding mills with a capacity of 210 mtph each; one cement-grinding mill, 120 mtph; two cement-grinding mills, each rated at 83 mtph; raw materials handling and dressing plant; mixing beds for limestone and clay; raw mix homogenizing

METRIC CONVERSION FACTORS

feet (ft.) x 0.3048 = meters (m.)
miles x 1.6093 = kilometers (km.)
cubic feet (cu. ft.) x 0.0283 = cubic meters (cu. m.)
cubic yards (cu. yds.) x 0.7646 = cubic meters (cu. m.)
short tons (s.t.) x 0.9072 = metric tons (m.t.)
horsepower, U.S. (h.p.) x 1.01387 = metric horsepower (m.h.p.)
degrees Centigrade = 5/9 (degrees Fahrenheit — 32)

plant; clinker handling system; Polab II laboratory automation. Electrical equipment supplier: Brown Boveri. Bulk loading and bagging plant: Haver & Boecker. Consultants: Arab Swiss Engineering Co. Scheduled onstream: 1982.

Ethiopia

Cement production			Capacity	
1976	1977	1978	1979	1980
.126	.113	.099	.119	.145

Gabon

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.180	.140	.420	.420

• N'toum (25 miles from Libreville). Societe des Ciments du Gabon. Capacity: 350,000 mtpy. Wet process using 460-ft.-long rotary kiln. Contract awarded to Creusot-Loire Entreprises and Lafarge Conseils & Etudes (France). Onstream: 1979.

Ghana (see also West Africa)

Cement production			Capacity	
1976	1977	1978	1979	1980
.679	.565	.489	.800	1.400

• Tema. Ghana Cement Works Ltd. Expansion to double plant capacity to 800,000 tpy. Due onstream in 1979.

Guinea, Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	—	.250

• Conakry. Contract awarded to Lafarge Conseils et Etudes for supervision of construction of clinker grinding plant in Conakry. Capacity: 250,000 mtpy. Start-up scheduled for 1981. The project is sponsored by the government of the Republic of Guinea, represented by the Estate Committee for Cooperation with the countries of the Arab League (Ministry of Planning and Cooperation).

• Three cement plant projects with a capacity of about 200,000 tpy are under consideration. Possible locations: Kindia (100 km east of Conakry); Lebekere (near the town of Mali on the Senegal border); Siguiri (on the Niger River near the Mali border).

Ivory Coast

Cement production			Capacity	
1976	1977	1978	1979	1980
.800	.961	.962	1.350	1.350

• Clinker grinding plants only.

Quantities in million metric tons

Kenya

Cement production			Capacity	
1976	1977	1978	1979	1980
.987	1.137	1.140	1.4	1.6

• East African Portland Cement Co.—Athi River Works. Uprating of the cement works from 265,000 mtpy to 450,000 mtpy of pozzolanic cement. Additional slurry milling and cement milling capacity being installed. Consultants: Blue Circle technical group. Onstream: 1980.

Liberia

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.089	.133	.220	.220

• Liberia Cement Corp.: Monrovia. Clinker grinding plant.

Libya (Libyan Arab Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
.7	1.5	1.8	2.7	3.9

• Near El Homs: National Cement & Building Materials Co. New 3,000 tpd dry process plant onstream in 1979. Major equipment supplied by Fives-Cail Babcock (France) includes: four-stage cyclone preheater; 5.4m × 88m rotary kiln; grate cooler; 1,300 tph crusher for limestone and clay; 80 tph crusher for gypsum and iron ore; 270 tph raw grinding unit; clinker grinding station with two 100 tph closed-circuit ball mills.

Madagascar, Democratic Republic of (Malagasy Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
.07	.05	.07	.07	.07

• E.S. Cement d'Antsirabe (Ibity, Province of Antsirabe). Contract awarded to Loesche GmbH for construction of new vertical kiln cement plant rated at 115,000 mtpy. Scheduled onstream in 1981.

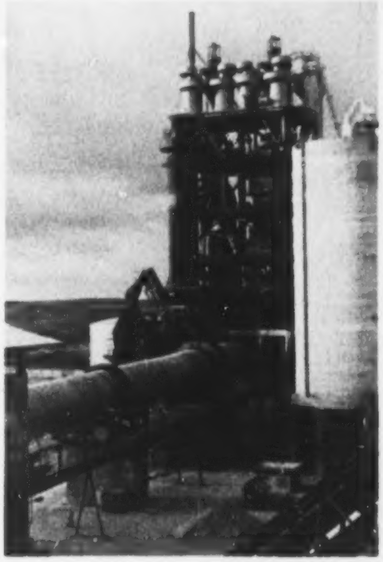
Malawi

Cement production			Capacity	
1976	1977	1978	1979	1980
.085	.094	.103	.144	.144

Mali

Cement production			Capacity	
1976	1977	1978	1979	1980
.086	.035	.034	.05	.05

• The government of the Republic of Mali is building a second cement plant with a capacity of 260,000 tpy at Diamou (400 km west of the capital, Bamako). Clinker grinding station will be built at Bamako. Clinker will be transported by rail from Diamou to Bamako. Plant is scheduled to go onstream in mid-1984. Prospective Engineering Gestion (Switzerland) is handling engineering and project management.



Libya: National Cement & Building Materials Co.'s new 3,000 tpd dry process plant went onstream in 1979. ***(Courtesy: Fives Cail-Babcock)***

Morocco

Cement production			Capacity	
1976	1977	1978	1979	1980
2.216	2.604	2.802	4.118	4.692

• Rabat—Asment de Temara S.A. Capacity: 500,000 mtpy. Onstream: 1979. Consulting engineer: Technip and Lafarge Conseils et Etudes. Special adviser to the client and start-up supervisor: The SNC Group. Major equipment, supplied by the Fuller Co., includes 15 ft. × 220 ft. rotary kiln; four-stage suspension preheater; 3.962 × 13.4m raw mill; 3.962 × 12.929m finish mill; inclined grate clinker cooler; dust collectors; pneumatic conveying system.

• Oujda—Cement Magrebine. New 1 million mtpy dry process plant at Oujda incorporates two Polysius Dopol preheater kilns rated at 1,980 tpd each. The Blue Circle Group provided consultant services. Onstream in 1979.

• Casablanca: Societe Nationale des Materiaux de Construction awarded contract for new 1 million mtpy dry process

Tunisia: Djebel Oum El Khelil 3,000 tpd plant, placed in operation in 1979, incorporates a Fives-Cail Babcock 5.4 × 96 m. rotary kiln equipped with a 4-stage cyclone preheater. *(Courtesy: Fives Cail-Babcock)*

plant to be built near Casablanca. The Blue Circle Group will provide consultant service. Operation was scheduled for 1980.

- Casablanca II: Lafarge Maroc S.A. Lafarge Conseils et Etudes are consulting engineers for 21.2 million-mtpy, dry-process plant scheduled for 1983 operation near Bouskoura. Fives-Cail Babcock is the turnkey contractor.

Mozambique

Cement production			Capacity	
1976	1977	1978	1979	1980
.217	.325	.354	.790	.990

Niger

Cement production			Capacity	
1976	1977	1978	1979	1980
.035	.036	.043	.040	—

- Malbaza—Societe Nigerienne de Cement. Lafarge Conseils et Etudes is consultant for 300,000 mtpy plant expansion incorporating a dry process preheater system. Start-up is scheduled for 1983.

Nigeria

Cement production			Capacity	
1976	1977	1978	1979	1980
1.274	1.400	1.500	2.230	4.152

- Ashaka Cement Co.—Two-kiln plant, rated at 800,000 mtpy, near Ashaka on the Gongola River. Onstream: 1979. Blue Circle Group participated as management partners on project. Each Polysius Gepol preheater kiln is rated at 1,150 mtpd.
- Benue Cement Co. Ltd.—Yandev plant. New plant incorporating two production lines rated at 1,450 mtpd clinker each. Start-up was scheduled for 1979. Major equipment, supplied by Humboldt Wedag, includes: two 4.4×64m rotary kilns equipped with four-stage Humboldt preheaters; two 4.4×8m tube mills for raw meal grinding.
- Blue Circle: Lichtenburg. Polysius furnishing one Dopol kiln plant with Prepol precalciner. Kiln dimensions are 14 ft.×207 ft; rated at 1,430 tpd. Scheduled onstream in 1983.

Reunion

Cement production			Capacity	
1976	1977	1978	1979	1980
.158	.158	.132	.210	.210

Senegal

Cement production			Capacity	
1976	1977	1978	1979	1980
.386	.330	.357	.400	.400

South Africa, Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
7.046	6.573	6.824	8.914	9.491

- Cape Portland Cement Co.: De Hoek.—onstream in 1980. Addition of one Polysius Dopol preheater kiln, rated at 1,600 tpd.

Sudan

Cement production			Capacity	
1976	1977	1978	1979	1980
.164	.150	.142	.370	.370

- Maspio Cement Corp.: Expanding Atbara plant. Major equipment, supplied by F. L. Smidth, includes: one 750 tpd rotary kiln, 15 ft.×12½ ft.×329 ft., with single-stage cyclone preheater and Unax planetary cooler; 10½ ft.×30 ft. raw mill; 11 ft.×36 ft. finish mill. Scheduled onstream: 1982.

Tanzania

Cement production			Capacity	
1976	1977	1978	1979	1980
.244	.247	.260	.300	.600

- Tanzania Saruji Corp.: Building a new plant at Tanga (in northeastern Tanzania). F. L. Smidth supplying major equipment, including: one 1,600 tpd kiln, 15 ft.×224 ft., with four-stage cyclone preheater and Unax planetary cooler; 15 ft.×25 ft. raw mill; 14½ ft.×43 ft. finish mill. Scheduled onstream in 1980.
- Tanzania Saruji Corp.: Awarded contract to F. L. Smidth to supply equipment for new 800 tpd plant at Mbeya in southwestern Tanzania. Major equipment includes: 4×6m, 1250 kW raw mill; 3.95×58m, 800 mtpd rotary kiln equipped with a four-stage cyclone preheater and Unax planetary cooler; 3.4×12m, 1820 kW finish mill. Scheduled onstream in 1981.

Togo (see West Africa)

Cement production			Capacity	
1976	1977	1978	1979	1980
.157	.239	.328	.300	.300

- Ciments du Togo: Lome, Togo. Extending capacity of clinker grinding plant from 300,000 mtpy to 500,000 mtpy. Scheduled for completion in 1981. Consulting engineers: Prospective Engineering Gestion.

Tunisia

Cement production			Capacity	
1976	1977	1978	1979	1980
.485	.615	.882	1.434	2.750

- Societe des Industries Cimentieres du Centre (SICC) has signed a contract with Holderbank Management and Consulting Ltd. for the engineering and project management of a cement plant to be built ner Enfida (100 km east of Tunisia). The plant will be rated at 1 million tpy. Production is slated for 1982 start-up. Equipment will be supplied by Kawasaki Heavy Industries in cooperation with C. Itoh & Co. and Marubeni Corp. Pyroprocessing unit will include a Kawasaki suspension preheater.
- Djebel Oum El Khelil cement plant: 3,000 tpd clinker dry process plant was scheduled to start operation in 1979. Major equipment, supplied by Fives-Cail Babcock, includes: 5.4×96m rotary kiln equipped with four-stage twin cyclone preheater; 5×16.25m, 230 tph raw mill; 4.6×15.25m, 140 tph finish mill.
- Les Ciments de Bizerte: Bizerte. Expansion via one dry process 700,000 mtpy kiln. Contractor: F. L. Smidth. Consulting engineer: Lafarge Conseils et Etudes. Start-up: was scheduled for 1979. Equipment, supplied by F. L. Smidth, includes: MPS mill; a 5.25×178m rotary kiln with two-stage cyclone preheater; two

44×13m Unidan mills; an electrofilter; and a Fluxo packer.

- Societe des Ciments Tunisiens: Planning 1 million mtpy dry process plant in the Tunis area, at Djebel Oust. Scheduled for 1983 operation. Consulting engineers: Lafarge Conseils et Etudes
- Societe Tunisienne de Ciment Blanc. White cement works, rated for 100,000 mtpy. Scheduled for 1984 operation. Consulting engineers: Lafarge Conseils et Etudes.

Uganda

Cement production			Capacity	
1976	1977	1978	1979	1980
.088	.09	—	—	—

- Uganda Cement Corp.: Hima (near Zaire border). Adding 600 tpd production line. Contract awarded to Humboldt Wedag. Dry process, using a preheater, 50×3.6m rotary kiln and a grate cooler.

West Africa (see Togo, Ghana, & Ivory Coast)

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	1.2	1.2

- Les Ciments de l'Afrique de l'Ouest has been formed by the West African governments of Togo, Ghana, and the Ivory Coast to build a 1.2 million tpy cement plant near Tabligo, Togo. The Blue Circle Group (Great Britain) has the contract for the engineering services. Polysius supplied the major equipment, including two Prepol precalciner kilns, each rated at 2,640 tpd. Onstream in 1979.

Zaire

Cement production			Capacity	
1976	1977	1978	1979	1980
.534	.488	.474	.860	.901

- Planning expansion of cement plant in Shaba.

Zambia

Cement production			Capacity	
1976	1977	1978	1979	1980
.460	.320	.278	.330	.370

- Planning extension of Zambian cement plant.

Zimbabwe

Cement production			Capacity	
1976	1977	1978	1979	1980
.541	.486	.404	.950	.950

ASIA

Afghanistan

Cement production			Capacity	
1976	1977	1978	1979	1980
.157	.157	.160	.860	N.A.

- In Kandahar region: New 1,600 mtph plant was scheduled for 1979 operation. Contract awarded to consortium consisting of Fuller Co., Fischbach-Moore International, and Oman Construction. Pyroprocessing system includes two preheater-equipped rotary kilns.

Bahrain

Cement production			Capacity	
1976	1977	1978	1979	1980
.092	.190	.210	.200	.200

- Clinker grinding plant only.

Quantities in million metric tons

Bangladesh

Cement production			Capacity	
1976	1977	1978	1979	1980
.227	.341	.350	.375	.395

Burma

Cement production			Capacity	
1976	1977	1978	1979	1980
.229	.250	.250	.540	.540

China, People's Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
49	56	66	N.A.	N.A.

National Technical Import Corp. of the People's Republic of China has awarded the following contracts for cement plants:

- For 2,000 tpd plant at Xuzhou. Ordered from Romania in 1978.
- For 4,000 tpd plant at Tangshan. Ordered from Ishikawajima Harima Heavy Industries Co. Ltd. (Japan) in 1979.
- For 4,000 tpd coal-fired plant at Anhui Province. Joint order in 1980 to Mitsubishi Heavy Industries, Ltd., Mitsubishi Mining & Cement Co., Ltd., and Meiwa Trading Co. Ltd. Scheduled for completion in 1984.

Hong Kong

Cement production			Capacity	
1976	1977	1978	1979	1980
.765	1.029	1.236	2.245	2.245

- China Cement Co.: Building new 1.5 million tpy plant in Castle Peak (New Territories). Scheduled onstream in 1983. Bendy Engineering provided preliminary engineering studies. Major equipment to be provided by Allis-Chalmers, including: 4,600 mtpd reinforced suspension preheater with major process auxiliaries and clinker grinding equipment; preheater tower (about 326 ft. height); 16 ft×250 ft. rotary kiln; three Compeb rotary finish mills, each 5,625 hp, 15 ft. diameter×45½ ft. length.

India

Cement production			Capacity	
1976	1977	1978	1979	1980
18.635	19.084	19.561	22.765	26.497

- Coromandel Fertilizers Ltd.: New 1 million mtpy dry process (precalcining system) plant will be built in the Cudappah district of Andhra Pradesh (south India).

Consulting engineering contract awarded to Holtec Engineering (Holderbank Management & Consulting Ltd.).

• Modi Rubber Ltd.: Holtec Engineers have prepared a report for a new 1 million mtpy cement plant to be located in the Raipur district of Madhya Pradesh in central India.

• State Industrial Development Corp. of Kerala (south India): Holtec Engineers have been retained by the corporation for the engineering of a new 1,200 mtpd cement plant to be built at Walayar in the Palghat district.

• Narmada Cement Co.: Jafarabad. New plant scheduled for 1981 start-up. Fuller Co. supplying following equipment: 15 ft. × 220 ft. rotary kiln; SF-141 flash calciner (3,000 mtpd); 12½ ft. × 45 ft. finish ball mill; two raw roller mills; coal roller mill; grate clinker cooler.

• Larsen & Toubro, Cement Machinery Div.: Constructing 3,200 mtpd dry process plant at Chandrapur, Maharashtra. The equipment will be based on the F. L. Smidth precalciner/kiln system. Scheduled onstream in 1982.

• Hetauda Cement Industries Ltd.: New 260,000 mtpy dry process plant to be built at Hetauda (west of Kathmandu), Nepal. Consulting engineers: Prospective Engineering Gestion.

• Birla Jute Manufacturing Co. Ltd.: Have placed an order with Larsen & Toubro and F. L. Smidth for an extension to their Patna Plant. The new installation will comprise a 2,500 mtpd dry process production line with precalcining kiln, raw grinding department, raw meal homogenizing plant, kiln department, and coal grinding plant.

• Century Spring & Manufacturing Co. Ltd.: Larsen & Toubro supplied major equipment for a 2,400 mtpd dry process plant at Maihan Madhya Pradesh. Scheduled onstream: 1979.

• Cement Corp. of India Ltd.: Installed 600 tpd kiln with four-stage cyclone preheater and Unax cooler at Rajban, Himachal Pradesh (northern region). Supplier: Cement Machinery Div., Larsen & Toubro (Bombay) and F. L. Smidth. Engineering consultants: Holtec Engineering. Onstream in 1979.

• Cement Corp. of India Ltd.: Installed three 1,200 tpd dry-process units at Neemuch, Akaltara and Yerrguntla Himachal Pradesh (western region). Supplier: Cement Machinery Div., Larsen & Toubro (Bombay). Engineering consultants: Holtec Engineering. Scheduled onstream: 1979.

• J. K. Synthetics Ltd.: Expansion at Nimbahera, Rajasthan. Equipment suppliers: Larsen & Toubro (Bombay) with F. L. Smidth. Major equipment includes 1,200 tpd, 14½ ft. × 210 ft. rotary kiln with four-stage cyclone preheater and Unax planetary cooler; 14 ft. × 23 ft. raw mill; and 12½ ft. × 36 ft. finish mill. Scheduled onstream: 1979.

• Andhra Cement Co., Ltd.: New dry process 1,200 tpd plant at Nadikudi in the Guntur district of Andhra Pradesh. Consultants: Techno Craft Engineering.

• Tadpatri Cements Ltd.: New 400,000 tpy plant at Tadpatri. Consultants: Techno Craft Engineering Ltd.

• Raasi Cement Co. Ltd.: New 200,000 tpy cement plant at Wazeerabad in the Nalgonda district of Andhra Pradesh. Consultants: Techno Craft Engineering.

• State Industrial Development of Orissa, India: Have retained Holtec Engineers for engineering a proposed 130,000 tpy expansion of its Hira cement plant which has a current capacity of 396,000 tpy. Scheduled for competion in 1982.

• Deccan Cements Ltd.: Nalgonda district of Andhra Pradesh. Holtec Engineers will build a small scale, 200 tpd capacity plant, scheduled to go onstream in 1982.

• Shri Bhogeshwara Cement and Mineral Industries Ltd.: Kurnool district of Andhra Pradesh. Holtec Engineers will build a small scale, 200 tpd capacity plant, scheduled to go onstream in 1982.

• Karnataka Cement Ltd.: Holtec Engineers have prepared a feasibility study for setting up a 200 tpd plant (rotary kiln with suspension preheater) in Gulbarga district of Karnataka.

• The Associated Cement Cos. Ltd.: Wadi Cement Works to be expanded by 1 million mtpy with installation of a new precalciner kiln, due onstream by end of 1981. Precalciner is a Mitsubishi fluidized unit.

• The Associated Cement Cos. Ltd.: Gagal (in Himachal Pradesh). New plant being set up with capacity of .56 mtpy. Will use Mitsubishi fluidized calciner system and coal as fuel. Major equipment for both plants will be supplied by ACC-Vickers-Babcock Ltd. Gagal plant scheduled for operation in 1982.

Indonesia

Cement production			Capacity	
1976	1977	1978	1979	1980
1.806	2.678	3.628	5.320	6.670

• P. T. Semen Baturaja: 500,000 mtpy plant at Baturaja, South Sumatra, is scheduled for completion in 1981, incorporating IHI SP-type precalcining system. Engineering consultants: Dyckerhoff GmbH.

• P. T. Perkasa Indonesia Cement Enterprise (Indocement Group): Cibinong, West Java. Adding a 3,200 tpd dry process production line. Major equipment suppliers are KHD Humboldt Wedag and Centunion (Spain). Production will be based on the Pyroclon process, using a 70 × 4.6m rotary kiln and a Humboldt twin-type preheater with secondary firing. Scheduled operation: 1980. A fourth production line with a 3,200 tpd output has been commissioned.

• P. T. Semen Tonasa: New 500,000 tpy plant projected for Biringere, Sulawesi. Scheduled operation: 1979. Engineering consultants: Dames & Moore and Dyckerhoff Engineering GmbH. Major processing equipment, supplied by F. L. Smidth, includes: 4.75 × 75m rotary kiln with four-stage suspension preheater; 4,150-hp Unidan finish grinding mill; FLS cement cooler.

• P. T. Semen Padang: New 2,000 tpd plant build at Indarung, Western Sumatra. Major equipment, furnished by F. L. Smidth, includes: one 2,000 tpd, 16½ ft. × 263 ft. rotary kiln with four-stage cyclone preheater and Unax planetary cooler; 16 ft.×28 ft. raw mill; 14½ ft.×39 ft. finish mill. Bendy Engineering Co. and H. K. Ferguson International Co. were consulting engineers. H. K. Ferguson is technical consultant for construction and start-up. Onstream in 1980. Extensions planned to expand capacity with another 600,000 tpy by 1981.

- P. T. Semen Andalas Indonesia has awarded the Mitsubishi Corp.-Kobe Steel consortium a contract to construct a 1 million ton per year cement plant in the northern part of Sumatra. Plant is scheduled to go onstream in early 1983. Will incorporate the NSP suspension preheater system developed jointly by Kobe Steel and Nihon Cement Co. Kobe Steel will supply engineering, equipment, and field construction. Blue Circle Industries will provide management and operation of the new plant.
- P. T. Perkasa Agung Utama Indonesia Cement Enterprise: KHD Humboldt Wedag and Centunion (Madrid) have received award to build a 4,600 tpd plant. Major equipment includes 5×78m rotary kiln; twin type Pyroclon preheater; Humboldt Wedag triple grate cooler. Scheduled for mid-1982 operation.

Iran

Cement production			Capacity	
1976	1977	1978	1979	1980
5.4	7.	9.	16.343	N.A.

- Because of the political situation in Iran, the status of cement plant construction activity is not known. The latest available data appeared in the January 1979 issue of PIT & QUARRY.

Iraq

Cement production			Capacity	
1976	1977	1978	1979	1980
—	4.6	6.5	7.075	7.075

- State Organization of Industrial Design & Construction: Awarded an order to construct a 1 million mtpy cement plant to Kawasaki Heavy Industries Ltd. and Marubeni Corp. The plant will be erected in Hit City (180 km west of Baghdad), using the Kawasaki suspension preheater system. Lafarge Conseils et Etudes is in charge of supervision of construction.
- Ministry of Industry and Minerals: New 3,200 tpd cement production line at Badoosh cement factory with Fives-Cail Babcock acting as general contractors. Start-up scheduled for end of 1982. Badoosh is located 26 km northwest of Mossoul.

Quantities in million metric tons

Israel

Cement production			Capacity	
1976	1977	1978	1979	1980
1.999	1.852	1.996	2.3	2.3

Japan (includes Ryukyu Islands)

Cement production			Capacity	
1976	1977	1978	1979	1980
68.198	75.176	84.353	108.973	N.A.

- Mitsui Cement Co.: Tagawa Works expansion via IHI SF precalcining system. Start-up of 5×75m kiln in 1979.
- Osaka Cement Co. Ltd.: Ibuki Works. Expansion via IHI SF precalcining system. A 2,700-mtpd, 3.8×79m kiln onstream in 1979.
- Sumitomo Cement Co. Ltd.: Hachinohe Works expansion via IHI SF precalcining system. A 4.7×75m kiln went onstream in 1979.
- Ube Kosan Co.: Kanda Works expansion via IHI SF precalcining system. Start-up of a 5.4×5.5×100m kiln in 1979.
- Chichibu Cement Co.: Chichibu Works expansion via IHI NSF five-stage precalcining system. A kiln started up in 1979.
- Hitachi Cement Co. Ltd.: Hitachi Works expansion via IHI five-stage precalcining system. A kiln started up in 1979.
- Mitsui Mining Co. Ltd.: Tagawa Works expansion via IHI NSF coal-firing, precalcining system adding one preheater state. A kiln started up in 1980.
- Nittetsu Cement Co. Ltd.: Muroran Works expansion via IHI NSF precalcining system, adding one preheater stage. A kiln started up in 1980.
- Chichibe Cement Co., Ltd.: Kumagaya Works via IHI NSF coal-firing precalcining system adding one preheater stage. A kiln started up in 1980.

Jordan

Cement production			Capacity	
1976	1977	1978	1979	1980
.533	.501	.553	.6	1.2

- Kaiser Engineers, Inc. (subsidiary of Raymond International, Inc.) will provide consulting engineering and construction management services for a 1 million mtpy cement plant to be built at Rashadiya, midway between Amman and Aqaba. Two 1,600 mtpd preheater kilns will be installed. Scheduled completion: 1982.

Nigeria: Ashaka Cement Co. two-kiln plant near Ashaka on the Gongola River went onstream in 1979. Each Polysius preheater kiln is rated at 1,150 tpd. *(Courtesy: Blue Circle Industries Limited)*

- Jordan Cement Factories Co. Ltd.: Fuheis. Fifth kiln, onstream in 1979, boosted production to 1.1 million mtpy. The kiln is a Polysius Dopol preheater unit. A sixth kiln is scheduled for operation in 1982. The new unit will use the DD process suspension preheater developed jointly by Kobe Steel and Nihon Cement Co. Kobe Steel will provide engineering, equipment supply, and field erection work. The contract was awarded to the Mitsubishi Corp./Kobe Steel consortium.
- The board of directors of the joint Jordanian-Syrian Industrial Co. has decided to establish a plant for the production of white cement in Jordan. Scheduled operation: 1983.

Korea (North)
Democratic Peoples Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
7.5	8.2	8.5	N.A.	N.A.

Korea (South), Republic of

Cement production			Capacity	
1976	1977	1978	1979	1980
11.873	14.418	15.467	20.3	23.3

- Union Corp., Seoul, has entered into a contract with F. L. Smidth covering the supply of machinery and electrical equipment for a new 300 tpd white cement plant to be erected at a site 200 km southwest of Seoul.

The order comprises a 3.45×60m rotary kiln with a two-stage cyclone preheater; Unax cooler and heat exchanger; a Tirax raw mill, and a Unidan cement mill, both with a Symetro gear.

- Ssang Yong Cement Industrial Co. Ltd.: Expanded Donghae plant—onstream 1980. Polysius supplied major equipment for two complete cement plant lines, including: two double rotator 15.7×55.7 ft. ball mills for raw grinding, each rated at 330 tph, with 3,100-hp motors; two five-stage Dopol preheaters with Prepol precalciners; two 4,620-tpd, 17 ft.×230×335 ft. rotary kilns with planetary coolers; two two-compartment ball mills for closed circuit cement grinding—each 16 ft.×54 ft., mill rated at 165 tph and equipped with a 7,200-hp. motor; four 21 ft. diameter turbo separators.
- Sung Shinn Chemical Co. Ltd: Expanded Tanyang plant—onstream 1979. Polysius supplied major equipment, including one Prepol preheater with precalciner/kiln rated at 3,300 tpd.
- Tong Yang Cement (Seoul) has started an expansion program for its Sam Chok plant. Fuller Co. is supplying equipment, including 48×60 in. jaw crusher; 42. in. gyratory crusher; two 10 ft.×70 ft. rotary dryers; two 13 ft.×45 ft. raw mills; two 16 ft.×245 ft. rotary kilns with four-stage twin preheaters; clinker coolers; three 13 ft×45 ft. finish mills; plus blending, conveying, and dust collecting equipment.

Kuwait

Cement Production			Capacity	
1976	1977	1978	1979	1980
.352	.329	.621	1.425	1.425

- Kuwait Cement Co.: Shuaiba. New 75,000 mtpy white cement plant was scheduled onstream in 1979. Major equipment furnished by KHD Humboldt Wedag.

Lebanon

Cement Production			Capacity	
1976	1977	1978	1979	1980
.506	1.600	1.310	2.452	N.A.

- Societe Libanaise des Ciments Blancs, Chekka Works: Dry process extension for white cement of 100,000 mtpy. Complete design and engineering: Lafarge Conseils et Etudes (France). Start-up was scheduled for 1979.

Malaysia

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.586	1.740	2.200	2.679	2.994

- Associated Pan Malaysia Cement Sdn Bhd: New 1.2 million mtpy plant built on site of existing Rawang cement plant. Machinery will be supplied and erected by Ishikawajima Heavy Industries. Malayan Cement Berhad, a Blue Circle Industries subsidiary, has a 50% equity in the project. Scheduled onstream: 1980.
- Bukit Sagu. Lafarge Conseils et Etudes have prepared a feasibility study for a new 500,000 mtpy cement plant.

Mongolia

Cement Production			Capacity	
1976	1977	1978	1979	1980
.144	.150	.170	.170	N.A.

Nepal

Cement Production			Capacity	
1976	1977	1978	1979	1980
.036	.040	.050	.044	.048

- Onoda Engineering and Construction Co. has been awarded a contract for construction of a 250,000 mtpy cement plant in Nepal, with completion scheduled for 1981.
- Hetauda Cement Industries Ltd.: Hetauda (125 km south of Kathmandu). New 260,000 tpy plant equipped with a preheater kiln is scheduled for mid-1983 operation. Prospective Engineering Gestion (Switzerland) is technical consulting firm.

Oman, Sultanate of

Cement Production			Capacity	
1975	1977	1978	1979	1980
.300	.392	—	—	—

- Oman Cement Co. is setting up a 1 million mtpy plant in the Muscat region. Production is scheduled to start in 1982.

Pakistan

Cement Production			Capacity	
1976	1977	1978	1979	1980
2.980	3.156	3.228	3.478	3.488

- Mustehkam Cement Ltd.: Added a 300,000 tpy dry process, one kiln unit. KHD Humboldt/Wedag Industrieanlagen supplied the major equipment. Scheduled onstream in 1980.
- Javedan Cement Ltd. (State Cement Corp. of Pakistan), Javedan. Adding a 300,000 tpy dry process, one kiln unit. Fuller Co. supplying major equipment, including: 13½ ft.×190 ft. rotary kiln with four-stage preheater; 12 ft.×26 ft, raw mill; 12 ft.×37 ft. finish mill; clinker cooler;
- Pak-Iran Cement: New 300,000 tpy plant, scheduled for 1980 operation, in Darwaza (Baluchistan).
- In Kohat (NWFP): New 300,000 tpy plant, scheduled for 1980 operation, in Darwaza (Baluchistan).
- Early in 1979, the government of Pakistan engaged the joint venture of Bendy Engineering Co., USA, and Industrial & Cement Engineering, Ltd., Pakistan, to prepare a feasibility study for the establishment of a new cement plant near Nizampur in Pakistan.

Philippines

Cement Production			Capacity	
1976	1977	1978	1979	1980
4.229	4.112	4.147	6.9	N.A.

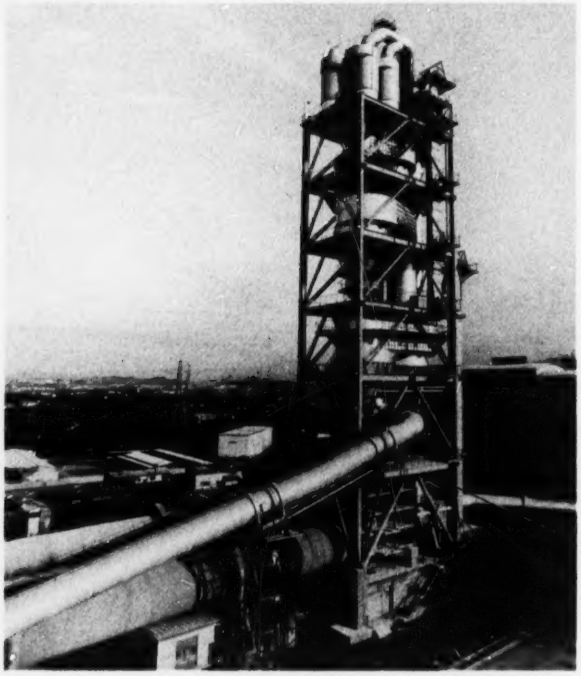
Qatar

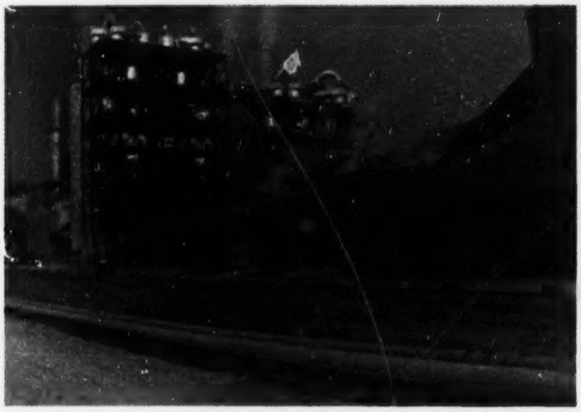
Cement Production			Capacity	
1976	1977	1978	1979	1980
.179	.176	.211	.240	.270

Saudi Arabia

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.300	1.292	1.510	2.800	4.960

- Buraidah Cement Co. (Qassim) will build a 2,000 tpd plant near Buraidah (400 km northwest of Riyadh). Equipment will be furnished by KHD Humboldt Wedag. Operation was scheduled for 1980. Binladen-Kaiser, a Saudi Arabian affiliate of Kaiser Engineers, Inc., was consulting engineer for the project.
- Saudi-Bahraini Cement Co. has awarded a contract to Ishikawajima-Harima Heavy Industries Co., Ltd. (IHI), Japan, for construction of a 6,000 mtpd plant at Abgeig (about 100 km west of Damman). Operation is scheduled for 1981. Four 1,500 mtpd kilns will be installed. Holderbank Management & Consulting Ltd. is acting as consultant for this project.
- Saudi Kuwaiti Cement Manufacturing Co. building new 7,000 tpd plant on the Arabian Gulf coast near Al Jubail in the east-





South Korea: Ssang Yong Cement Industrial Co., Ltd.'s expanded Donghae plant was placed onstream in 1980. Polysius supplied two complete cement plant lines, each rated at 4600 stph. ***(Courtesy: Polysius Corp.)***

Japan: Mitsui Mining Co.'s Tagawa Works extension added IHI NSF precalcining system in 1980. ***(Courtesy: IHI Inc.)***

ern province. Prospective Engineering Gestion (Switzerland) is consulting engineer for the project. Plant is scheduled to be operational in 1983.

• Southern Province Cement Co.: New 5,000 mtpd plant to be erected at plant site 35 km east of the Red Sea, 60 km southeast of the city of Gizan, and 11 km from the Yemen border. The joint-venture turnkey contract was awarded to the Fuller Co. and Hyundai International, Inc. (Korea). Consulting firm was Basse Sambre-E.R.I., S.A. The plant has been designed with two cement manufacturing systems side by side, each with a capacity of 2,500 mtpd. Major equipment incorporated in the process includes two 42 in. gyratory crushers, two 6,000-hp, 15 ft. × 42 ft.-long raw ball mills, a blending and kiln feed system, two 14½ ft. × 210 ft.-long kilns, two preheaters with flash calciners, two clinker coolers, as well as two 7,000-hp, 15 ft. × 48 ft.-long finish ball mills. Scheduled start-up: 1981.

• Yanbu Cement Co. Ltd.—New plant to be built near Ra's Baridi (at the Red Sea). Contract for construction was issued to KHD Industrieanlagen Humboldt Wedag AG (W. Germany). Plant will have two production lines with daily output of 3,000 tons of clinker, and was scheduled to go onstream in 1980.

• Yanbu Cement Co. and Arabian Cement Co., both of Jidda, have awarded a consulting job for planning, construction, and equipment installation for two new cement plants to Naigai Consulting Co., subsidiary of Onoda Cement Co., Japan. The mills will be built near Jidda and have a production capacity of 1 million tpy. KHD Industrieanlagen Humboldt Wedag is the major equipment supplier.

• Jizan Cement Co.: Two 2,500 mtpd precalciner kilns under construction in southern province. Major equipment supplier is Fuller Hyundai, as a joint venture. Scheduled onstream in 1981.

Singapore

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.500	1.415	1.575	2.750	2.750

Sri Lanka

Cement Production			Capacity	
1976	1977	1978	1979	1980
.422	.480	.575	.715	.915

Syria (Syrian Arab Republic)

Cement Production			Capacity	
1976	1977	1978	1979	1980
1.110	1.395	1.467	2.031	2.313

• Adra Cement Co.: New plant at Adra with two production lines, each with 1,000 tpd dry process kiln. Scheduled onstream in 1979. Plant and equipment supplied by Zab/Sket of the German Democratic Republic.

• Tartous Cement Co.: Two 600 tpd dry process kilns to come onstream at Tartous in 1980.

Taiwan

Cement Production			Capacity	
1976	1977	1978	1979	1980
8.757	10.334	11.461	11.158	13.368

• Asia Cement Corp.: Hualien. Adding a 3,000 tpd production line, using KHD Humboldt Wedag Pyroclon process (short rotary kiln and twin-type preheater with secondary firing system). Scheduled onstream in 1980.

• Chia Hsin Cement Corp.: Kangshan plant. Expansion was expected to start up in 1980. Fuller Co. supplying following equipment: one 15 ft. × 220 ft. rotary kiln; one preheater; one flash calciner; one Fuller-Loesche roller mill; one clinker grate cooler; blending system.

• Hsin-Hsin Cement Co. (Taipei). Major equipment furnished by Polysius for a 2,200-mtpd plant included: 3,200-hp center discharge raw mill, 4.4m-diameter × 15m-long, with two

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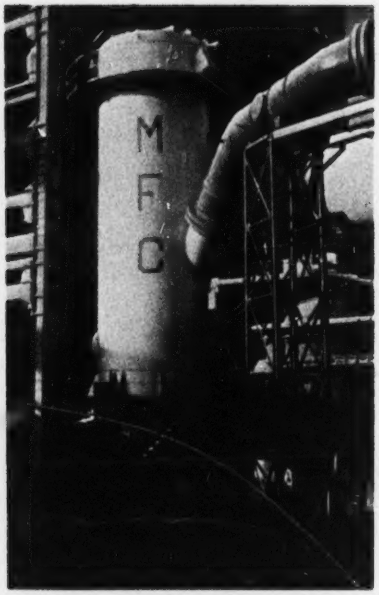
Quantities in million metric tons



India: The Associated Cement Co.'s, Ltd. are expanding their Wadi Cement Works with installation of a Mitsubishi Fluidized Calciner (MFC) system to add one million mtpy. *(Courtesy: The Associated Cement Companies, Limited)*

6m-diameter air separators; cyclone preheater with precalcining system; 4m-diameter × 65m-long rotary kiln; traveling grate cooler; 5,200-hp cement mill, 4.4m-diameter × 16m-long, rated at 120 mtph, with two 6m-diameter air separators; homogenizing system; central control system; pneumatic equipment; bagging plant. Onstream in 1979.

• Taiwan Cement Co. has signed a contract with F. L. Smidth for an extension of the Suao plant. The order covers a 3,200-tpd rotary kiln with a four-stage preheater and a precalciner, a Folax cooler, and a coal mill. Scheduled onstream: 1980.

• China Rebar Co. Ltd.: Tung Shan. Allis-Chalmers providing equipment and engineering services for conversion of MIAG-type suspension preheater to precalcining. Capacity will be increased from 2,400 to 3,000 mtpd. Start-up was scheduled for 1980.

Thailand

Cement Production			Capacity	
1976	1977	1978	1979	1980
4.458	5.088	5.180	N.A.	N.A.

• Siam Cement Co. Ltd.: Adding 4,000 tpd production line at Ta Luang (about 140 km from Bangkok). Equipment contract awarded to F. L. Smidth. The kiln will be of the dry process type with four stage preheater and separate precalciner. Other equipment includes: 3,050 kW raw mill, homogenizing plant, Folax cooler, and electrostatic precipitator. Scheduled onstream: 1981. An additional 4,000 tpd extension has been ordered. F. L. Smidth will supply major equipment, including: kiln with four-stage preheater and separate precalcining string; FLS bridge scraper storage for limestone and clay; Duodan raw mill; raw mill silo.

• The Siam Cement Co. Ltd. is expanding another plant at Tabkwang, Saraburi (approx. 130 km from Bangkok), by a new 4,000 tpd production line. Main machinery, to be supplied by F. L. Smidth, includes a 4.75 × 75m rotary kiln with four stage cyclone preheater and separate precalciner, a Folax cooler, two raw mills, and two cement mills with Symetro gear.

• Thai Lanna Cement Co.: Planning 2,300 tpd plant to go into operation by 1981 in the Lampang area.

United Arab Emirates (Abu Dhabi, Dubai, Sharja, Ajman, Fujaira, Umm al Quaiwan, Ras al Khaima)

Cement production			Capacity	
1976	1977	1978	1979	1980
.305	.310	.370	1.871	1.871

• Gulf Cement Co.: Ras al Khaimah. New 1 million mtpy cement plant to be built by UBE Industries of Japan. The W. S. Atkins Group will act as consultants for design and on-site supervision of construction. The project will utilize the UBE flash calciner system. Scheduled onstream in 1981.

• Union Cement Co., Ltd.: Ras al Khaimah. Third kiln of 1,500 tpd capacity is due onstream in 1980. Plant will incorporate Ishikawajima-Harima Heavy Industries Co., Inc. SF-type burning system (flash furnace/four-stage cyclone preheater/3.6m × 52m rotary kiln).

• Al-Ain Cement Factory: Al-Ain, Abu Dhabi. New 1,800 mtpd plant will use the IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.) SF-type cement sintering system. Holderbank Management & Consulting Ltd. will act as consultant for planning and implementation of the project. Operation is scheduled for 1981.

• Emirate of Fujairah has awarded a construction contract to Voest-Alpine for a 1,600 tpd dry process plant. Kaiser Engineers, Inc. are the consultants on the project. Scheduled onstream in 1983.

Vietnam

Cement production			Capacity	
1976	1977	1978	1979	1980
—	.250	.350	1.	2.

• Technoimport has contracted with F. L. Smidth to supply equipment for a new 3,100 tpd plant at Hoang Thach near Dong Trieu. Equipment includes a 775 tpd crusher, blending and storage equipment for 43,000 tons of raw materials, an 18½ ft. × 23 ft., 3900-kW finish mill, an 18 ft. × 293 ft. kiln with four-stage twin preheaters and planetary cooler; a 6,500-kW finish mill, 17 ft. × 46 ft.; and equipment for dispatch of cement in bulk and sacks. The system further includes equipment for advanced, computerized control systems.

• Cimenterie de Ha Tien, Kien-Luong plant: Technoimport has awarded a contract to French subsidiary of Polysius AG for addition of a Dopol kiln, complete with a precalcining system and auxiliary equipment. The kiln has a capacity of 1 million tpy and was scheduled for 1980 operation. Major equipment includes: one precalcining system rated for 3,000 mtpd with 4.8 × 60 × 89.5m kiln with planetary coolers; one 4,500-hp air-swept raw mill, 5.2 × 11m, rated for 240 mtph; two 4,200-hp cement mills, each 4.2 × 14m, rated for 90 mtph.

Yemen (Yemen Arab Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
—	—	—	.068	.060

• Cement plant is to be constructed at Bajil, near Hodeida, with a capacity of 200,000 tpy.

• A 1,500 tpd dry process plant scheduled for 1982 operation near Amran. IHI (Japan) will supply engineering and equipment procurement and handle construction.

ANIA

Australia

Cement production			Capacity	
1976	1977	1978	1979	1980
5.062	5.023	5.013	N.A.	N.A.

- Goliath Portland Cement Co., Ltd.: Railton, Tasmania plant expansion using Humboldt Wedag Pyroclon precalcination preheater system. Will double plant's production to 1 million mtpy. Scheduled for 1981 operation.
- Blue Circle Southern Cement Ltd.: Berrima plant expanded. F. L. Smidth, via licensee Vickers Ruwolt of Melbourne, was the supplier of major equipment, including: a 16½ ft. × 280 ft. rotary kiln, rated at 2,300 tpd, with four-stage cyclone preheater and Unax planetary cooler; and an 1,800 kW MPS raw mill. Start-up was scheduled for 1979.

Fiji Islands

Cement production			Capacity	
1976	1977	1978	1979	1980
.069	.075	.086	.125	.250

New Caledonia

Cement production			Capacity	
1976	1977	1978	1979	1980
.054	.041	.050	.180	.180

New Zealand

Cement production			Capacity	
1976	1977	1978	1979	1980
1.	.910	.800	1.400	1.400

EUROPE

Albania

Cement production			Capacity	
1976	1977	1978	1979	1980
.700	.700	.750	1.	N.A.

Austria

Cement production			Capacity	
1976	1977	1978	1979	1980
5.758	5.904	5.611	7.745	8.165

- Voralberger Zementwerke Loruns AG: Bludenz. Replacing a wet process kiln wih a KHD Humboldt Wedag preheater kiln plant. The new clinker production line will include: four-stage Humboldt preheater; 2.8 × 23m rotary kiln; 2.25 × 23m tube cooler. Kiln capacity rated at 260 tpd. Scheduled onstream: 1981.
- FR. Schmid: Waldegg. Added one Polysius Dopol 825 tpd preheater kiln. Onstream in 1980.
- Peggauer Cement plant Alois Kern: Peggau. Added one Polysius Lepol preheater/kiln, rated at 880 tpd. Onstream 1979.

Belgium

Cement production			Capacity	
1976	1977	1978	1979	1980
7.504	7.764	7.576	N.A.	N.A.

Bulgaria

Cement production			Capacity	
1976	1977	1978	1979	1980
4.361	4.666	5.149	N.A.	N.A.

Cyprus

Cement production			Capacity	
1976	1977	1978	1979	1980
1.026	1.074	1.107	1.140	1.200

Quantities in million metric tons

Czechoslovakia

Cement production			Capacity	
1976	1977	1978	1979	1980
9.552	9.750	11.1	N.A.	N.A.

- Czechoslovak Cement Industry: Prachovice. Adding a 1.2 million tpy plant. Scheduled to go into operation: 1979.

Denmark

Cement production			Capacity	
1976	1977	1978	1979	1980
2.270	2.151	2.537	2.425	2.500

Finland

Cement production			Capacity	
1976	1977	1978	1979	1980
1.825	1.736	1.718	2.910	2.910

France

Cement production			Capacity	
1976	1977	1978	1979	1980
30.567	30.403	31.175	36.600	36.900

- Ciments d'Origny: Origny Ste. Benoite. Added one Prepol at precalciner kiln, rated at 1,925 tpd. Onstream in 1980.

Germany—East (German Democratic Republic)

Cement production			Capacity	
1976	1977	1978	1979	1980
11.345	12.103	12.5	N.A.	N.A.

Germany—West (Federal Republic of Germany)

Cement production			Capacity	
1976	1977	1978	1979	1980
33.832	31.671	32.993	35.	35.

- Dyckerhoff Zementwerke AG: Modifying clinker production line at Fortuna plant at Geseke by installing a KHD Humboldt Wedag Pyroclon preheater system to increase production from 800 to 1,500 mtpd. Scheduled onstream in 1981.
- Dyckerhoff Zementwerke AG: Lengerich plant. Installing Polysius Prepol preheater with precalciner/kiln, rated at 1,500 mtpd.

Greece

Cement production			Capacity	
1976	1977	1978	1979	1980
8.592	10.467	11.333	12.775	13.125

- Halyps Cement Co. S.A.: Aspropyrgos. Adding one 1,500 tpd dry process kiln. Scheduled onstream: 1980.
- Titan Cement Co. S.A.: Kamari plant extension with a 3,000 tpd cement unit. F. L. Smidth supplied main machinery, including: 5 × 80m, 3,000 tpd rotary kiln equipped with a four-stage cyclone preheater and a Unax planetary cooler; 3,310 kW raw mill with air separator; and 4.6 × 14m, 4,500 kW finish mill with air separator. Onstream in 1979.
- Heracles General Cement Co. S.A.: Planning 1.5 million mtpy plant at Milaki in Euboea to replace Piraeus plant. Scheduled onstream in 1982.
- Heracles General Cement Co., S.A.: Volos cement plant. Converting production lines four and five to the KHD Humboldt Wedag Pyroclon process. Clinker production of line four, equipped with a single-line Humboldt preheater, increased from 1,700 to 2,100 mtpd; that of kiln line five, with a two-line preheater, increased from 2,300 to 3,000 mtpd.

Hungary

Cement production			Capacity	
1976	1977	1978	1979	1980
4.298	4.621	4.764	4.857	5.200

Greece: Titan Cement Co.'s new 3,000 tpd production line, onstream in 1979, incorporates an FLS rotary kiln equipped with a 4-stage cyclone preheater and a Unax planetary cooler. *(Courtesy: F.L. Smidth & Co., Inc.)*

Iceland

Cement production			Capacity	
1976	1977	1978	1979	1980
.144	.139	.133	.200	.200

Ireland

Cement production			Capacity	
1976	1977	1978	1979	1980
1.617	1.581	1.795	2.150	2.150

- Irish Cement Ltd: Limerick plant. Adding 2,100 tpd capacity. F. L. Smidth supplying main equipment, including: 4.75 × 75m rotary kiln with four-stage cyclone preheater with calciner in the riser pipe; Unax cooler; raw mill; two cement mills; one coal mill installation; and electrostatic precipitators.

Italy

Cement production			Capacity	
1976	1977	1978	1979	1980
36.624	38.439	38.493	49.953	N.A.

- Unicem S.A.: Arcangelo. Plant conversion begun in 1980. Adding 600 tpd Polysius Lepol kiln with preheater grate and Recupol cooler.

Luxembourg

Cement production			Capacity	
1976	1977	1978	1979	1980
.299	.619	.935	.420	.420

Netherlands

Cement production			Capacity	
1976	1977	1978	1979	1980
3.476	3.894	3.918	5.220	5.220

Norway

Cement production			Capacity	
1976	1977	1978	1979	1980
2.681	2.420	2.339	1.765	1.740

Poland

Cement production			Capacity	
1976	1977	1978	1979	1980
19.908	21.304	21.678	N.A.	N.A.

Portugal

Cement production			Capacity	
1976	1977	1978	1979	1980
3.749	4.413	5.163	5.5	5.5

- CIMPOR—Cimentos de Portugal E.P.: Expanding production line at the Souselas works (in the north of Coimbra). Major equipment to be supplied by Polysius. Doubles capacity of plant to 2 million mtpy. Scheduled for 1980 operation.

Romania

Cement production			Capacity	
1976	1977	1978	1979	1980
12.6	13.1	14.	N.A.	N.A.

Spain (includes Canary Islands)

Cement production			Capacity	
1976	1977	1978	1979	1980
25.961	29.422	32.064	39.854	44.014

- Hornos Ibericos S.A.: Contract awarded to KHD Humboldt Wedag to set up a cement plant in cooperation with Centunion Corp. (Madrid) near Carboneras, about 50 km east of Almeria. Capacity of unit will be 3,000 tpd in a dry process rotary kiln with a Pyroclon preheater. Scheduled onstream in 1980.
- Cementos Portland S.A.: Olazagutia. Converting to Fuller SF process via an 1,800 mtpd flash calciner plus cooler expansion. Start-up scheduled for 1981.

Sweden

Cement production			Capacity	
1976	1977	1978	1979	1980
2.819	2.578	2.370	2.575	3.725

- Cementa AB: Added 4,700 mtpd production equipment to its Slite plant (on Gotland Island). Polysius Corp. supplied major equipment, including: 2,400 hp double roller mill rated at 400 mtph; 4.6 × 5.2m-diameter × 80m-long rotary kiln with precalcining and cyclone preheater unit; two 6,000 hp, 4.8m × 15.5m cement mills, each rated at 120 mtph; homogenizing system. Start-up was scheduled for 1979.

Switzerland

Cement production			Capacity	
1976	1977	1978	1979	1980
3.546	3.649	3.698	6.300	6.300

Turkey

Cement production			Capacity	
1976	1977	1978	1979	1980
12.421	13.869	15.409	18.732	19.552

- Canakkale Cimento Sanayii A.A., Instanbul, awarded contract to Fuller Co. to supply the process equipment and engineering for a 2,500 mtpd cement plant. Contract included 16½ ft. × 255 ft. rotary kiln and four-stage preheater, Fuller-Loesche roller mill, two finish mills, clinker cooler, kiln feed system, and blending system. Onstream in 1979.
- The Aslan, Turkey plant of Aslan ve Eskihisar Muttahit Cimento ve su Kirechi Fabrikalari A.S. planned expansion of capacity from 480,000 to 1 million mtpy.
- Further expansion of cement production is planned in Turkey. The Cisan (Turkiye Cimento Sanayee T.A.S.), the Turkish national cement enterprise, has placed an order with KHD Humboldt Wedag for the erection of seven cement plants. All plants will be dry process systems using Humboldt preheaters. The plants will be built according to one concept, retaining the same plant dimensions. Their clinker production will average about 1,750 mtpd with slight variations due to the different altitude levels of the plants and different raw materials deposits. Engineering consultants: Dyckerhoff Engineering GmbH.

United Kingdom

Cement production			Capacity	
1976	1977	1978	1979	1980
16.357	16.054	16.564	19.621	19.434

- Steetley Ltd.: Thrislington, England. Added one Polysius Gepol preheater/kiln, rated at 680 tpd. Onstream 1979.
- Rugby Portland Cement Co. Ltd.: Rochester, England. Added a 5.6×44m Polysius Lepol grate coupled with a 5.5×4.75×86m F. L. Smidth rotary kiln with Unax planetary coolers to produce a rated output of 2,200 mtpd of clinker. Uses semi-wet process, pressure filters, and sieve kneaders. Onstream in 1980.
- Ribblesdale Cement Co. Ltd.: Lancashire, England. Plant extension. F. L. Smidth supplying main equipment, including: circular raw material storage; raw mill; 2,300 tpd single-string suspended preheater with precalciner; 4.15×58m kiln with bypass; Folax grate cooler; two conditioning towers; and three electrostatic precipitators. Scheduled onstream: 1982.

U.S.S.R.

Cement production			Capacity	
1976	1977	1978	1979	1980
123.960	127.000	129.3	140.	N.A.

Yugoslavia

Cement production			Capacity	
1976	1977	1978	1979	1980
7.617	8.155	8.642	12.049	14.065

- Dalmacija Cement: Expanded Paitizan plant with 3,200 mtpd addition. Polysius Corp. furnished major equipment, including: 3,750 hp, 4.6m-diameter ×15.5m—long, center-discharge raw mill, equipped with two 6.5m-diameter air separators; 4.6m×70m rotary kiln equipped with precalcining preheater; two 5,400 hp, 4.4m-diameter×16m-long cement mills, each rated at 100 mtph. Onstream in 1979.
- Fabrika Cementa Novi Popovac: Expanding Popovac plant with a 2,000 tpd addition. Major equipment being supplied by F. L. Smidth and Pragoinvest includes: 16½ ft.×263 ft. rotary kiln, rated at 2,000 tpd, equipped with four-stage cyclone preheater and Unax planetary cooler; 16 ft.×27 ft., 2,800-kW raw mill; 16 ft.×46 ft., 5,160-kW finish mill. Scheduled onstream: 1981.
- Extension of Kosjeric plant situated about 150 km southwest of Belgrade. In cooperation with the Yugoslav firm, Progres Invest, F. L. Smidth is supplying the following major equipment: 825 tph crusher; circular prehomogenizing storage for limestone; 1,600 kW raw mill; 4.15×58m precalciner kiln with four-stage preheater and Folax cooler; two 4.4×12m Combidan cement mills; 4×5m Tirax coal mill; portal scraper storage; automatic control equipment. The new production line will add 2,200 tpd capacity.

NORTH AMERICA

Canada

Cement production			Capacity	
1976	1977	1978	1979	1980
9.898	9.933	10.473	17.025	17.382

- Canada Cement Lafarge Ltd.: Expanding plant at Exshaw, Alberta, to add 600,000 tpy. Equipment includes: F. L. Smidth gas-fired 3.95×56m kiln, rated at 1,950 mtpd and equipped with a four-stage preheater with precalciner; Fuller 3.96×12.62m, 3,700 hp, two-compartment raw mill; F. L. Smidth 4.60×14.02m, 6,000 hp finish mill; Fuller clinker cooler; Wheelabrator electrostatic precipitator; Fuller-Kinyon conveying equipment. Operation was scheduled for 1980. Lafarge Consultants Ltd. are the engineering consultants for the expansion.
- Ciment Quebec, Inc.: St. Basile de Portneuf, Quebec. Plant expansion will replace existing 1,100 tpd wet process plant with a Fuller SF system rated at 2,000 tpd. Fuller Co. is furnishing major equipment, including: four-stage preheater with flash calciner; cooler; Fuller-Loesche airswept roller mill; blending equipment; Airslide conveying equipment; Fuller-Kinyon pumps; and dust collectors. Scheduled onstream in 1981.
- Federal White Cement Ltd.: Woodstock, Ontario. New 100,000 tpy white cement plant onstream in 1979. Lafarge Consultants Ltd. handled design, engineering, project management, site supervision, training of personnel, and start-up assistance.
- Inland Cement Industries Ltd. (Genstar Ltd. subsidiary): Edmonton, Alberta. Plant expansion was expected to start up in 1980. Equipment, furnished by Fuller Co., includes: four-stage preheater with flash calciner; 13½ ft.×190 ft. rotary kiln; clinker cooler; blending equipment; Airslide conveyors; Fuller-Kinyon conveying equipment. Technical and engineering services provided by Blue Circle Industries Ltd.
- St. Lawrence Cement Co.: Mississauga, Ontario. Expanded via a Fuller SF flash calciner to increase production from 3,000 to 4,500 mtpd. Added cooler section and new kiln drive. Scheduled onstream in 1980.

United States of America

Cement production			Capacity	
1976	1977	1978	1979	1980
65.248	67.973	72.471	91.5	95.

U.S. developments are covered elsewhere in this issue.

Quantities in million metric tons

CENTRAL AMERICA

Bahamas

Cement production			Capacity	
1976	1977	1978	1979	1980
.270	.070	.330	.520	.730

Barbados

- Governments of Barbados and Guyana have signed a contract with Holderbank Consulting Ltd. (Canada) for engineering and project management of plant to be built on Barbados Island. The plant is rated at 250,000 tpy and is scheduled for operation in 1980. Sixty percent of the clinker will be ground into cement in the Barbados plant; the other portion will be shipped to Guyana for grinding. In recent years, Barbados has imported 30,000-70,000 tpy of cement

Costa Rica

Cement production			Capacity	
1976	1977	1978	1979	1980
.362	.406	.426	.592	1.042

- Cementos del Pacifico (subsidiary of Corporacion de Desarrollo): New 1,300 mtpd cement plant onstream in 1980 in the province of Guanacaste (75 miles west of San Jose). Allis-Chalmers and Ateinsa (Spain) provided equipment and technical services. The contract included an Allis-Chalmers roller mill with 1,750 hp drive motor; suspension preheater; 14 ft. × 197 ft. rotary kiln; 8 ft. × 22 ft. inclined/10 ft. × 41 ft. horizontal stoker cooler; 13 ft. × 42 ft. finish grinding Compeb mill with a 4,000 hp motor. Asland S.A. (Spain) is providing staff training and start-up assistance.

Cuba

Cement production			Capacity	
1976	1977	1978	1979	1980
2.501	2.600	2.712	3.39	4.89

- Desarrollo Industrial: Rene Arcay Cement works: Mariel. Expansion, scheduled for 1980 operation, was to double capacity to 4,400 tpd. Humboldt Wedag has furnished a two-shaft hammer crusher rated at 900 tph limestone. Engineering was provided by KHD Industrieanlagen AG in cooperation with Centunion (Madrid). In addition, a ship-loading installation is being built.

Dominican Republic

Cement production			Capacity	
1976	1977	1978	1979	1980
.842	.863	.873	1.411	1.421

El Salvador

Cement production			Capacity	
1976	1977	1978	1979	1980
.322	.334	.9	.614	.964

- Cemento de El Salvador S.A.: Dry process system expansion at El Ronco, Metapan plant onstream in 1979. Major equipment for this 1,000 mtpd addition, furnished by Allis-Chalmers, includes: 13½ ft. × 209 ft. × 273 ft. rotary kiln; 177 ft high, four-stage preheater; satellite cooler consisting of nine 5½ ft. × 50 ft. tubes; 13 ft. × 22 ft. diaphragm ball mill; 12 ft. × 36 ft. Compeb-type finish mill.

Guadeloupe

Cement production			Capacity	
1976	1977	1978	1979	1980
.131	.133	.162	.250	.250

Guatemala

Cement production			Capacity	
1976	1977	1978	1979	1980
.445	.489	.540	.840	.840

- Cementos Progreso S.A.: Expanding San Miguel plant with a 1,600 mtpd clinker production line. Start-up was scheduled for 1979. F. L. Smidth supplied the major equipment, including: 4.55m-diameter × 68 × 90m-long kiln; four-state suspension preheater; 165 mtph raw mill; 85 mtph raw mill; 10 planetary cooler tubes; electrostatic precipitator; storage, material handling, and shipping equipment. Bendy Engineering Co. performed engineering work.

Haiti

Cement production			Capacity	
1976	1977	1978	1979	1980
.246	.266	.249	.300	.330

- Lafarge Consultants Ltd., Montreal, has signed a contract with the Department du Commerce et de l'Industrie of the Republic of Haiti to complete the preparation for the construction of a new cement plant in Gonaives, Haiti.

Honduras

Cement production			Capacity	
1976	1977	1978	1979	1980
.254	.250	.271	.621	.636

- Industria Cementera Hondurena, S.A.: Piedras Azules (north central Honduras). New plant under construction in 1979 for production of 1,200 metric tons per day of clinker plus more than 500,000 mtpy of portland and pozzolanic cement. Scheduled onstream in 1981. Kawasaki-Itoh is furnishing main equipment, including: Kawasaki-Hazemag 300 mtpd crusher; 4.4 × 9m raw mill; 1,200 mtpd kiln with four-stage preheater and satellite cooler; and 46 mtpd finish mill.
- Cementos de Honduras, S.A.: Expanding its Rio Bijao plant near the town of San Pedro Sula with a 2,000 tpd production line. Order was awarded to F. L. Smidth and includes: two circular storage sections for limestone homogenizing; a raw grinding plant with a 3,000 kW Duodan mill; a 4.55 × 68m, 2,000 tpd kiln with four-stage preheater and riser pipe calcining; a Unax cooler. Holderbank Consulting Ltd., Ontario, Canada, handled studies, conceptual work, procurement of equipment, and basic design.

Jamaica

Cement production			Capacity	
1976	1977	1978	1979	1980
.365	.333	.294	.425	.425

- Caribbean Cement Co. Ltd.: Expanding its Kingston plant with a 1,300 mtpd installation. Major equipment being supplied by Allis-Chalmers includes: a 14 ft. × 197 ft. rotary kiln with a suspension preheater; a cooler with an 8 ft. × 22 ft. inclined section and a 10 ft. × 42 ft. horizontal section; and a roller mill.

Martinique

Cement production			Capacity	
1976	1977	1978	1979	1980
.119	.129	.131	.250	.250

Mexico

Cement production			Capacity	
1976	1977	1978	1979	1980
12.584	13.277	15.265	16.938	19.493

- Cemento Portland Nacional S.A. (Empresas Tolteca de Mexico, S.A. group): Hermosillo, Sonora (plant is about 25 km from Hermosillo). New 1 million tpy plant scheduled to go onstream in 1982. F. L. Smidth will supply major equipment and also will erect and commission the plant. Engineering is being done by Blue Circle Industries which has a 49% share in the company. The main FLS equipment consists of a 4.35m-diameter × 66m kiln with single-string, four-stage preheater and precalciner; Folax grate cooler; two 4.8m-diameter × 8.57m-long raw mills with 1800 B Symetro gears; two 4.8m × 12.5m-long cement mills with 2020 BC Symetro gears—all are arranged for closed-circuit grinding, crushing, and homogenizing. Smidth also will supply dedusting equipment and all auxiliary and electrical equipment, including instrumentation and control.

- Cimentos de Chihuahua, S.A.: Chihuahua, Chih. Expanding plant by a 1,700 mtpd clinker line. Scheduled onstream in late 1981. Main machinery to be supplied by F. L. Smidth includes: 4.8 × 9m Duodan mill with central Symetro drive; homogenizing system; four-stage preheater; 4.55 × 68m kiln equipped with Unax planetary cooler. Sereland (Spain) is in charge of design, equipment procurement, and supervision of the expansion.

- Cooperativa Manufacturera de Cemento Portland "La Cruz Azul," S.C.L.: Cruz Azul, Hidalgo. Plant expansion start-up in 1979. Fuller Co. equipment supplied includes: 17 ft. × 270 ft. rotary kiln with four-stage twin preheater; clinker cooler; and blending equipment.

- Cooperativa Manufacturera de Cemento Portland "La Cruz Azul": Lagunas, Oaxaca. Expanding Lagunas plant capacity from 3,600 tpd to a total of 5,000 tpd. Krupp Polysius is furnishing major equipment including: Dopol kiln with a 3,600 tpd Prepol precalciner and a 4,200-tpd grate cooler.

- Cementos Mexicanos S.A.: Valles, Est. San Luis Potosi. In the autumn of 1978, Cementos Mexicanos S.A. placed an order with F. L. Smidth for the main machinery for a 2,200 tpd expansion of their Valles plant. The equipment includes a 4.15 × 58m precalciner kiln with type 824S Folax cooler, a 4.6 × 7.6m, 2,200 kW raw mill, and a 4.6 × 14m, 4,400 kW cement mill, both with Symetros.

Costa Rica: Cementos del Pacifico placed its new 1300 tpd plant onstream in 1980 in the province of Guanacaste. Pyroprocessing equipment includes a MIAG 4-stage heat exchanger and an Allis-Chalmers 14′ × 197′ rotary kiln. *(Courtesy: Asland S.A., Spain)*

- Cementos Mexicanos S.A.: Monterrey, Est. Nuevo Leon. At the beginning of 1979, Cementos Mexicanos S.A. followed up their Valles expansion project with a similar extension of their Monterrey plant. The new kiln and associated raw mill and cement mill will be identical to the F. L. Smidth Valles equipment. Holderbank Consulting Ltd., Ontario, carried out basic conceptual work, equipment procurement, drawings, and process control engineering.

- Cementos Mexicanos S.A.: Torreon, Est. Coahuila: Cementos Mexicanos S.A. put the third kiln in their Torreon plant into operation in August 1979. F. L. Smidth supplied a 4.55 × 68m kiln with four-stage preheater, Unax cooler, and TUM 4.6 × 7.6m raw mill with Symetro gear. A new 2,200 tpd production line will be supplied by F. L. Smidth.

- Cementos Guadalajara S.A. put a new production line into operation at their Ensenada, Baja, Calif. plant during October 1979. The equipment comprises a four-stage preheater kiln with Unax planetary cooler, a TUM 4.6 × 7.6m, 2,200 kW raw mill and a UM 3.8 × 11.2m, 2,200 kW cement mill, both with Symetros. The main machinery was supplied by F. L. Smidth.

- Cementos Apasco S.A. has placed an order with F. L. Smidth for equipment for a new 2,200 tpd cement plant at Macuspana in the state of Tabasco. The order includes a 4.15 × 58m rotary kiln, a Tirax mill, and a Unidan mill. Operation was scheduled for 1980.

- Cementos Vera Cruz S.A. (Empresas Tolteca de Mexico, S.A. group): Orizaba, Vera Cruz. Expansion slated for mid-1981 operation. Installing one Polysius Prepol preheater with precalciner/kiln, rated at 2,400 tpd. Holderbank Consulting Ltd., Ontario, carried out engineering, design studies, and equipment procurement.

- Cementos Tolteca S.A.: Zapotiltic. Expansion of 2,500 mtpd. Main equipment by F. L. Smidth includes: two Tirax-Unidan 5.6 × 8.25m raw mills, 4,500 kW each; silo blending system; four-stage preheater with firing in riser pipe; 4.75 × 75m rotary kiln with Unax planetary cooler. This is a Blue Circle project.

Nicaragua

Cement production			Capacity	
1976	1977	1978	1979	1980
.226	.226	.199	.340	.350

Panama

Cement production			Capacity	
1976	1977	1978	1979	1980
.282	.270	.300	.510	.565

Trinidad and Tobago

Cement production			Capacity	
1976	1977	1978	1979	1980
.238	.215	.220	.224	.224

- Trinidad Cement Ltd.: Claxton Bay, Trinidad. Expansion to add 300,000 tpy capacity.

Quantities in million metric tons

SOUTH AMERICA

Argentina

Cement production			Capacity	
1976	1977	1978	1979	1980
5,712	6.002	6.316	8.776	11.061

- Juan Minetti S.A.: New 540,000 mtpy plant was scheduled for operation in 1980. Major equipment supplied by KHD Humboldt Wedag and cooperating partner Centunion (Spain) will include: 4.4 × 64m rotary kiln; 4 × 13m, 2,790 kW clinker grinding mill rated at 100 tph.
- Loma Negra Compania Industrial Argentina, S.A.—Olivarria: Expansion, onstream in 1980, includes: modification of existing long, dry kiln to two-stage preheater unit; capacity increase from 1,200 mtpd to 1,600 mtpd; modification of existing Polysius preheater to precalcining; capacity increase from 2,400 to 3,500 mtpd; one 4,000 hp cement mill, 4.2 × 14m, rated for 80 mtph at 2900 Blaine.
- Cemento Noroeste: La Rioja province. Projected new plant with a capacity of 350,000 mtpy.
- Corp. Cementera Argentina S.A.: Capdeville plant. Expansion incorporating F. L. Smidth 2,000 tpd kiln with a four-stage cyclone preheater and a Folax grate cooler. Scheduled operation: 1980.
- Corp. Cementera Argentina S.A.: Yocsina plant. Adding F. L. Smidth four-stage cyclone preheater.
- Calera Avellaneda S.A.: Olavarria. Converted second production line to the KHD Humboldt Wedag Pyroclon process for raw meal precalcining. Modification raises clinker production rate of that line from 1,000 mtpd to 1,500 mtpd. Scheduled onstream in 1980.
- Cementera Santa Cruz: New .636 million tpy plant will be built by Spanish firm, Ateinsa, in Santa Cruz province. Site is on the Deseado River, near Pico Truncado. Calcite will be used from Cementera's nearby quarry. Scheduled onstream in 1983.
- Cementos Noa: Juramento, province of Salta. Constructing new 650,000 tpy plant. Asland S.A. has technical responsibility for the project and plant. Buhler-Miag and Ateinsa providing major equipment including: limestone crusher; clay crusher; Miag 3,800 kW raw mill; 4.6 × 70m kiln with four-stage preheater; 3,800 kW cement mill; bagging plant. Scheduled onstream: end of 1982.

Bolivia

Cement production			Capacity	
1976	1977	1978	1979	1980
.220	.153	.170	.328	.525

- Fabrica Nacional de Cemento S.A.: Cal Orcke plant expansion via one 200,000 tpy dry process kiln.
- Sociedad Boliviana de Cemento S.A.: Viacha plant expansion via a 500 tpd F. L. Smidth dry process kiln, onstream in 1979.
- Lafarge Consultoria e Estudios, subsidiary of Lafarge Conseils et Etudes (Lafarge Group) for Latin America, has been awarded a consulting engineering contract in Bolivia for the construction of the new Yacuces cement plant in the province of Chiquitos, department of Santa Cruz. The contract was awarded by the Corporacion Regional de Desarrollo (Regional Development Agency) of Santa Cruz. The new dry process plant will have an annual clinker production capacity of 335,000 tons, and the kiln will be equipped with a cyclone preheater. Start-up is scheduled for 1983.

Brazil

Cement production			Capacity	
1976	1977	1978	1979	1980
19.147	21.123	23.203	27.	30.

- Cimento Maua, S.A. (Companhia Nacional de Cimento Portland), Cantagalo, state of Rio de Janeiro. New plant, scheduled onstream in 1981, has been designed for a 700,000 mtpy production. Equipment, to be supplied by a consortium of F. L. Smidth and Christiani-Nielsen, will include a 3.95 × 56m precalciner kiln with Folax grate cooler; a 5.2 × 9.75m raw mill; and a 3.8 × 12m cement mill. CNCP and Lafarge Consultoria e Estudio (Brazil) are the consulting engineers on the project.
- Camargo Correa Industrial S.A.: Expanding Apiai, Sao Paulo plant with a 3,500 tpd precalciner-preheater kiln addition. Expansion will also include crushing, grinding, material handling, and shipping equipment. Engineering design to be provided by Bendy Engineering Co.
- Cimento Itau do Parana S.A.: Rio Branco do Sul, Parana plant, doubled capacity with 1,000 tpd production line. F. L. Smidth supplied equipment including: 4.15 × 60m kiln with four-stage preheater and Unax planetary cooler; 4 × 7m raw mill; 4 × 12m cement mill. Onstream in 1980.
- Cia de Cimento Portland Gaucho: Pinheiro Machado, Rio Grande do Sul plant expansion via one 200,000 tpy dry process kiln. Was scheduled onstream in 1979.
- Cia de Cimento Portland Poty: Sao Jose Paulista. Pernambuco plant expansion via one 2,000 tpd dry process kiln. Scheduled operation: 1980.
- Cia Materiais Sulfurosos-Matsulfur: Montes Claros, Minas Gerais plant expansion via a F. L. Smidth 2,000 tpd dry process kiln. Scheduled operation: 1979.
- Cimento Tocantins S.A.: Sobradinho plant expansion planned via a 1,000 tpd dry process kiln.

- Cimenvale—Mineracao e Cimento Vale do Itajai S.A.: New plant at Brusque, Santa Catarina, under construction.
- Ciminas—Cimento Nacional de Minas S.A.: Doubling of present capacity of Pedro Leopoldo plant under consideration.
- Cia Agro-Industrial de Monte Alegre: New plant with one wet process 1,000 tpd kiln was due onstream in 1979.
- Cia Cearense de Cimento Portland: Sobral, Ceara plant expansion with oné F. L. Smidth 1,000 tpd dry process kiln. Onstream in 1980.
- Cia de Cimento Portland Goias: Palmeiras De Goias. Onstream in 1980. One Polysius precalciner kiln rated at 880 tpd.
- Cia de Cimento Portland de Sergipe: New plant with one 1,000 tpd dry process kiln at Laranjeiras, Sergipe. Was scheduled onstream in 1979.
- Cimento Santa Rita: Itapevi cement works. Increasing capacity of No. 4 kiln line from present 800 mtpd to 1,350 mtpd by addition of Humboldt Wedag Pyroclon system for precalcination of raw meal. Equipment and installation to be provided by a consortium of KHD Humboldt Wedag and Zanini of Brazil.
- Cimento Tupi S.A.: Pedra do Sino and Volta Redonda Cement Works. A consortium, Zanini Equipamentoes Pesados S.A./Humboldt Wedag Div. of Otto Deutz S.A. Motores e Tratores, is supplying equipment for expansion of both plants. At Pedra do Sino (about 400 km west of Rio de Janeiro), the production of a cement clinker line is being increased from a previous 1,800 metric tons to 2,550 metric tons per day via the Humboldt Wedag Pyroclon process. In Volta Redonda (about 150 km southwest of Rio), where blast furnace slag is produced, a drying plant for slag and another grinding plant are under construction.
- Cimento Portland Asland do Parana—Planning construction of 1.4 million tpy plant in the state of Parana. Technical assistance from Asland do Brazil.
- Cia. Cimento Portland Itau: Itau de Minas (Minas Gerais) plant extension. F. L. Smidth supplying: 4×7m raw mill; 4.55 ×68m Unax kiln; two 4.4×13m cement mills.
- Cia. de Cimento Portland Rio Branco: Curitiba (Parana) plant. Adding two new production lines, each rated at 2,200 tpd. F. L. Smidth will supply major equipment, including: 5×8.5m raw mill; 5×80m Unax kiln; two 4×12m cement mills.
- S.A. Industrias Votorantim: Salto de Pirapora, state of Sao Paulo. New 2,500 tpd plant to be built. F. L. Smidth will supply major equipment, including: 5×10.75m raw mill; 5×80m Unax kiln; two 4.2×13m cement mills.

Ecuador: Empresa Cementos Selva Alegre S.A.'s Otavalo plant is located 9,000 feet above sea level in the Ecuadorian Andes. Allis-Chalmers Canada furnished major equipment including a 14½' × 204' kiln equipped with 206' high preheater. *(Courtesy: Allis-Chalmers)*

Chile

Cement production			Capacity	
1976	1977	1978	1979	1980
.963	1.126	1.176	1.920	1.930

Colombia

Cement production			Capacity	
1976	1977	1978	1979	1980
3.622	3.430	4.140	5.630	5.780

- Acerias Paz del Rio: Setting up a 600,000 tpy slag cement plant at Belencito, province of Boyaca. Major equipment suppliers are Kawasaki Heavy Industries Ltd. and Marubeni Corp. Completion was scheduled for 1980.
- Fabrica de Cemento Samper, S.A. has awarded a contract to F. L. Smidth for the extension of its La Calera plant, 30 km from Bogota. The 1,500 tpd production line inclues a 1,500 tpd 5.×165m rotary kiln with two-stage cyclone preheater and Unax planetary cooler. Scheduled onstream in 1981.
- Cementos del Caribe, S.A.: Barranquilla. Expanding wet process plant with Allis-Chalmers 14 ft.×12.5 ft.×450 ft., 800 mtpd kiln and Allis-Chalmers 900 mtpd stoker-type cooler. Was scheduled for 1980 operation.

Ecuador

Cement production			Capacity	
1976	1977	1978	1979	1980
.608	.623	.834	1.099	1.369

- Empresa Cementos Selva Alegre S.A.: Building a 345,000 mtpy plant at Otavalo which was scheduled for start-up in 1980. Allis-Chalmers Canada Ltd. furnished major equipment including: 206 ft.-high preheater, 14½ ft.×204 ft. rotary kiln, stoker cooler, raw and finish grinding mills. SNC Inc. of Montreal served as the engineer/manager.
- La Cemento Nacional: Guayaquil. Expanding Cerro

Quantities in million metric tons

Blanco plant. F. L. Smidth supplying the following major equipment for a 1,500 mtpd addition: 4.35×66m kiln equipped with a single-string, four-stage preheater; Folax grate cooler; 4.6×8.25m Tirax Unidan raw mill; Allis-Chalmers 13 ft.×45 ft. Compeb clinker grinding mill, 4200 hp; continuous silo blending system; dust collectors. Scheduled onstream in mid-1981. Holderbank Consulting Ltd. was the engineering consultant firm.

- Empresa Industrias Guapan S.A.: Azogues. New plant scheduled for 1981 start-up. Equipment, to be supplied by Fuller Co., includes one 13-1/2 ft.×190 ft. rotary kiln; 1,100 mtpd suspension preheater; 13 ft. diameter ×26 ft. Aerofall raw mill; 12 ft. diameter×37 ft., two-compartment finish mill; air-quenching grate cooler; blending silo aeration system; Airslide fluidizing gravity conveying systems; Fuller-Kinyon pumps; Plenum-Pulse dust collectors; central control console. Sereland (Spain) is providing consulting engineering and technical assistance.

Paraguay

Cement production			Capacity	
1976	1977	1978	1979	1980
.155	.200	.166	.200	.200

Peru

Cement production			Capacity	
1976	1977	1978	1979	1980
1.966	1.965	2.800	2.821	3.067

- Cementos Lima S.A.: 3,000 tpd expansion at Ataconga plant (near Lima) was scheduled onstream in 1979. Major equipment includes: precalciner kiln; 6,000 hp raw mill; 6,000 hp cement mill. Holderbank Consulting Ltd. (Canada) holds the engineering work contract.

- Cementos Norte Pacasmayo: Expanded Pacasmayo plant from 1,000 to 3,000 mtpd; completion was scheduled for 1979. Fuller Co. has equipment contract which includes: raw and finish open-circuit mills; 13 ft.×190 ft. rotary kiln; preheater with flash calciner; coolers; dust collectors; fluidizing conveyors; and blending equipment.

- Cemento Yura S.A.: Arequipa. Adding one 1,000 tpd dry process kiln. Fuller Co. supplied the following equipment: one 12 ft.×37 ft. raw mill; one blending system; one 12 ft.×37 ft. finish mill; five Plenum-Pulse dust collectors. Start-up was scheduled for 1980.

Surinam

Cement production			Capacity	
1976	1977	1978	1979	1980
.052	.047	.056	.065	.065

Uruguay

Cement production			Capacity	
1976	1977	1978	1979	1980
.678	.691	.686	.786	.786

- Administration Nacional de Combustibles Alcohol y Portland (ANCAP): Added 500 mtpd system to its existing 400 mtpd plant in Paysandu. Major equipment, supplied by Fuller-GATX (Pty) Ltd. of South Africa, includes: rotary kiln, four-stage preheater, clinker cooler, mills, blenders, pneumatic conveyors, and dust collection equipment. Start-up was scheduled for 1979.

Venezuela

Cement production			Capacity	
1976	1977	1978	1979	1980
3,475	3.408	4.150	7.187	8.387

- Cementos Caribe: Puerto Cumarebo (near Coro on northern coast of Venezuela). New 1 million mtpy plant onstream in 1979. Humboldt Wedag supplied major equipment including; Pyroclon precalcining suspension preheater; 17 ft.×270 ft. rotary kiln section; planetary cooler. Holderbank Consulting Ltd. (Canada) provided engineering and management work.

- Cementos Catatumbo: New 600,000 mtpy plant in state of Zulia onstream in 1980. Lafarge Consultants Ltd. (Canada) was consultant for design, procurement, project management, and start-up assistance. Creusot-Loire Entreprises supplied the major equipment, including preheater-equipped kiln. Plant is equipped with a four-stage preheater/precalciner rotary kiln, 145 tph raw mill, and 75 tph finish mill.

- Cemento Andino S.A.: Valera. In 1978, purchased following equipment from Polysius Corp.: precalcining system with 4.2×65m kiln rated for 1,800 mtpd; 4.4×10.5m raw mill rated for 138 mtph, with two 5.2m-diameter separators; 4×13.5m cement mill rated for 90 tph with two separators.

- C.A. Venezolana de Cementos: Pertigalete plant. Expansion in 1977 added one 800-tpd wet process kiln. Expansion scheduled for 1979 operation incorporated a 2,700 tpd dry process kiln.

- Consolidada de Cementos C.A.: Expansion at San Sebastian, Est. Aragua plant via one 2,400 tpd Allis-Chalmers dry process kiln. Scheduled onstream in 1982. ●

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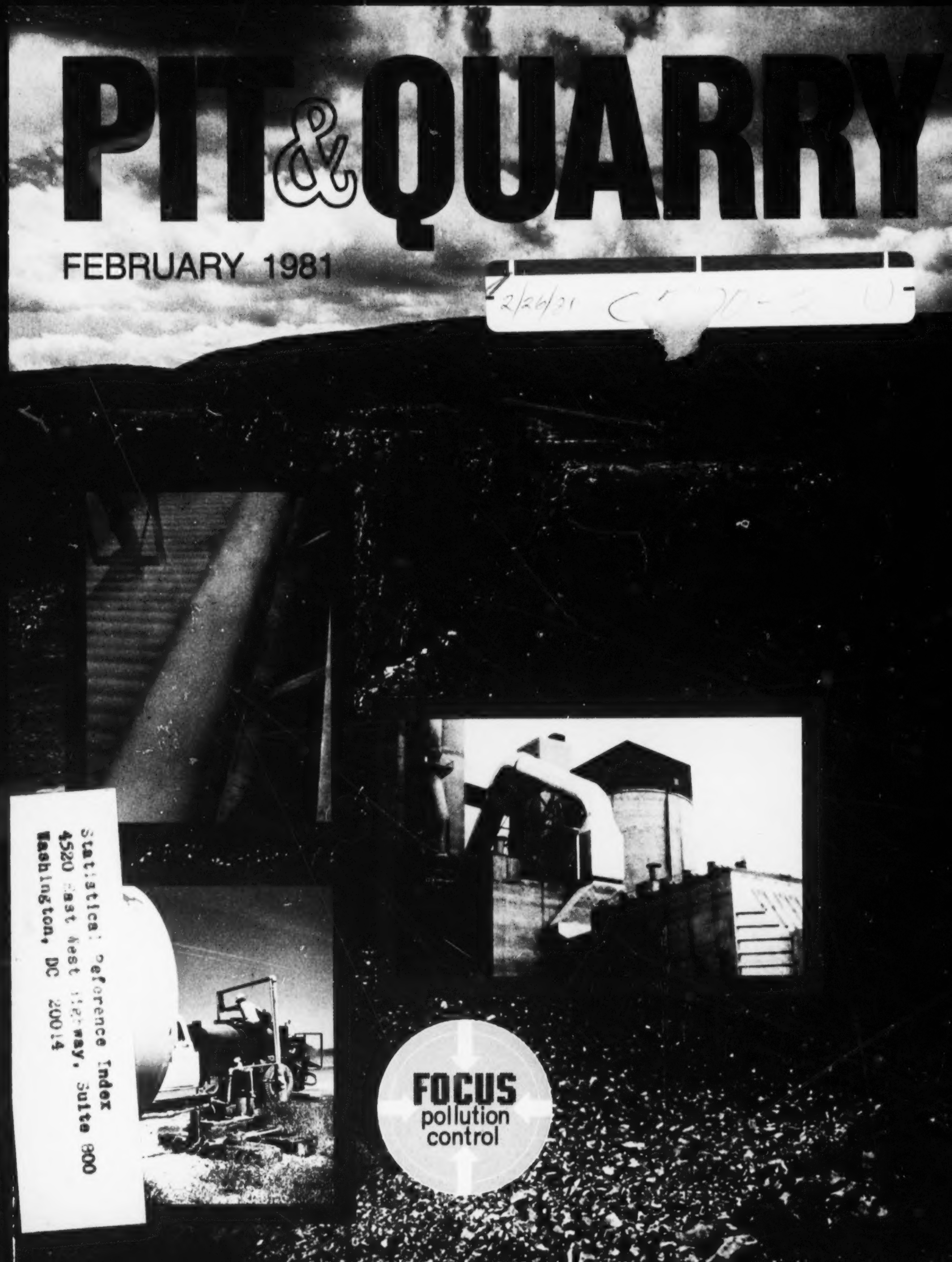
Quantities in million metric tons



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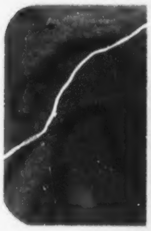

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MEMBER

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COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1980 Nov.	1979 Nov.	% Change
Nonresidential Building	$ 5,007.9	$ 3,732.8	+34
Residential Building	5,847.1	4,704.1	+24
Nonbuilding Construction	2,441.2	3,295.1	−26
Total Construction	$ 13,296.2	$ 11,732.0	+13

	1980 11 mos.	1979 11 mos.	% Change
Nonresidential Building	$ 47,767.1	$ 46,717.2	+ 2
Residential Building	57,654.8	70,356.1	−18
Nonbuilding Construction	29,271.3	40,926.8	−28
Total Construction	$134,693.2	$158,000.1	−15

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(1972 = 100, seasonally adjusted)

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**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Martin Marietta Awards Baghouses Contract

Flex-Kleen Corp., a Research-Cottrell Environmental company, has received an order from Martin Marietta which includes the first baghouses to meet the new explosion containment standard for coal handling equipment. The contract is for 19 pulse jet baghouses to collect dust from coal, cement, and limestone in 24 cement plant process areas. Three of the 19 dust collectors will filter coal mill dust and meet the new explosion containment specs.

The baghouses will go into Martin Marietta's Davenport, Ia. cement plant. Scheduled for operation in August 1981, the $80-million plant is designed for an annual output of 850,000 tons.

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North American cement companies: capacities and ownership

Changes in the corporate structure of the United States cement industry are continuing. A number of companies have been acquired by, or merged with, U.S. conglomerates or foreign interests in the past several years. Canadian company inter-relationships were increased last year with Genstar Ltd.'s acquisition of The Flintkote Co.

Current ownership of North American cement companies is shown in this PIT & QUARRY compilation. Approximate annual capacities, as of the end of 1980, are given for the parent company as well as the number of plants in the United States and Canada. The capacity data include gray, white, and grinding-only plant production. ●

Company	Subsidiary of:	Capacity-msty (number of plants)	
		United States	Canada
Aetna Cement Corp.	Lake Ontario Cement Co. (Canada)		•
Alamo Cement Co.	Cementeria Robilante (Italy) & Cementwerke Vigier (Switzerland)	.470 (1)	
Allentown Cement Div. (National Gypsum Co.)	General Dynamics Corp.	•	
Alpha Portland Cement Co.	Alpha Portland Industries, Inc.	2.050 (6)	
Amcord, Inc.	Gifford-Hill & Co., Inc.	•	
Arkansas Cement Corp.	Arkansas Louisiana Gas Co.	.850 (1)	
Ash Grove Cement Co.		1.306 (2)	
Atlantic Cement Co., Inc.	Newmont Mining Corp.	1.550 (1)	
Arizona Portland Cement Co.	California Portland Cement Co.	•	
Bessemer Cement Co.	Louisville Cement Co.	•	
California Portland Cement Co.		3.030 (3)	
Canada Cement Lafarge, Ltd. (Canada)		1.040 (1)	6.490 (13)
Centex Cement Corp.		.300 (1)	
Ciment Quebec, Inc. (Canada)			.480 (1)
Citadel Cement Corp.	Canada Cement Lafarge, Ltd. (Canada)	•	
Columbia Cement Corp.	Filtrol Corp.	.905 (2)	
Coplay Cement Manufacturing Co.	Societe des Ciments Francais (France)	1.100 (2)	
Cyprus Hawaiian Cement Corp.	Cyprus Mines Corp.	.270 (1)	
Dundee Cement Co.	Holderbank Financiere Glarus AG (Switzerland)	3.480 (3)	
Federal White Cement Ltd. (Canada)			.121 (1)
Flintkote Co., The	Genstar Ltd. (Canada)	•	
Florida Mining & Materials Corp.	Moore McCormack Resources Inc.	.660 (1)	

Company	Subsidiary of:	Capacity-mmty (number of plants)	
		United States	Canada
General Dynamics Corp.		3.210 (2)	
General Portland Inc.		4.892 (8)	
Genstar Ltd. (Canada)		3.100 (4)	2.215 (5)
Giant Portland Cement Co.		.855 (1)	
Gifford-Hill & Co., Inc.		6.112 (6)	
Gifford-Hill Portland Cement Co.	Gifford-Hill & Co., Inc.	*	
Gulf Coast Portland Cement Co.	McDonough Co.	.900 (1)	
Hercules Cement Co. (Amcord)	Gifford-Hill & Co., Inc.	*	
Huron Cement Div. (National Gypsum Co.)	General Dynamics Corp.	*	
Ideal Basic Industries, Inc.		6.460 (13)	
Illinois Cement Co.		.376 (1)	
Independent Cement Corp.	St. Lawrence Cement Co. (Holderbank Group) (Canada)		*
Independent Cement Inc. (Canada)			1.200 (1)
Inland Cement Industries Ltd. (Canada)	Genstar Ltd.		*
Kaiser Cement Corp.		3.743 (5)	
Keystone Portland Cement Co.		.625 (1)	
Lake Ontario Cement Ltd. (Canada)		.550 (1)	1.670 (1)
Lehigh Portland Cement Co.	Portland Zementwerke Heidelberg AG (West Germany)	3.200 (5)	
Lone Star Industries, Inc.		8.665 (13)	
Lone Star Lafarge Co.	Lone Star Ind. & Lafarge Fondu International	NA (1)	
Louisville Cement Co.		2.470 (3)	
Marquette Cement Co.	Gulf + Western Industries Inc.	4.117 (17)	
Martin Marietta Cement	Martin Marietta Corp.	4.736 (8)	
Medusa Cement Co. (Medusa Corp.)	Crane Co.	4.124 (4)	
Miron Inc. (Canada)	Ghaith R. Pharaon (Saudi Arabia)		1.160 (1)
Missouri Portland Cement Co.	H.K. Porter Co., Inc.	2.630 (3)	
Monarch Cement Co., The		.900 (1)	
Monolith Portland Cement Co.		.700 (1)	
National Cement Co., Inc.	Societe des Ciments Vicat (France)	.800 (1)	
National Portland Cement Co. of Florida, Inc.	National Portland Cement Co., The	.350 (1)	
Nevada Cement Co.		.400 (1)	
National Gypsum Co., Cement Div.	General Dynamics Corp.	*	
North Dakota Cement Co.	Canada Cement Lafarge Ltd. (Canada)	(sales office)	
Northeast Cement Co.	Citadel Cement Corp. (Canada Cement Lafarge) (Canada)	(sales office)	
North Star Cement Ltd. (Canada)			.159 (1)
Northwestern States Portland Cement Co.		1.000 (1)	
OKC Corp.	in liquidation		
Oregon Portland Cement Co.		1.500 (3)	
Peerless Cement Co. (Amcord)	Gifford-Hill & Co., Inc.	*	
Penn-Dixie Industries, Inc.		2.417 (6)	
Phoenix Cement Co. (Amcord)	Gifford-Hill & Co., Inc.	*	
Portland Cement Co. of Utah	Lone Star Industries, Inc.	*	
Puerto Rican Cement Co.		1.200 (1)	
Rinker Materials Corp.		.520 (1)	
River Cement Co.	IFI International S.A. (Italy)	1.200 (1)	
Riverside Cement Co. (Amcord)	Gifford-Hill & Co., Inc.	*	
St. Lawrence Cement Co. (Canada)	Holderbank Financiere Glarus A.G. (Switzerland)		2.700 (2)
St. Marys Cement Co. (Canada)	St. Marys Cement Ltd.	.400 (1)	1.780 (2)
San Juan Cement Co., Inc.		.810 (1)	
Santee Portland Cement Corp.	Dundee Cement Co.	*	
SME Cement, Inc.	Standard Machine & Equipment Co.	.375 (1)	
South Dakota Cement Commission	State of South Dakota	1.000 (1)	
Southwestern Portland Cement Co.	Southdown, Inc.	2.960 (5)	
Texas Cement Co.		.500 (1)	
Texas Industries, Inc.		2.830 (3)	
Universal Atlas Cement Div.	United States Steel Corp.	1.943 (4)	
Whitehall Cement Manufacturing Co., The		.790 (1)	
Wyandotte Cement, Inc.	St. Marys Cement Co. (Canada)	*	

**See parent company; capacity included in that data*

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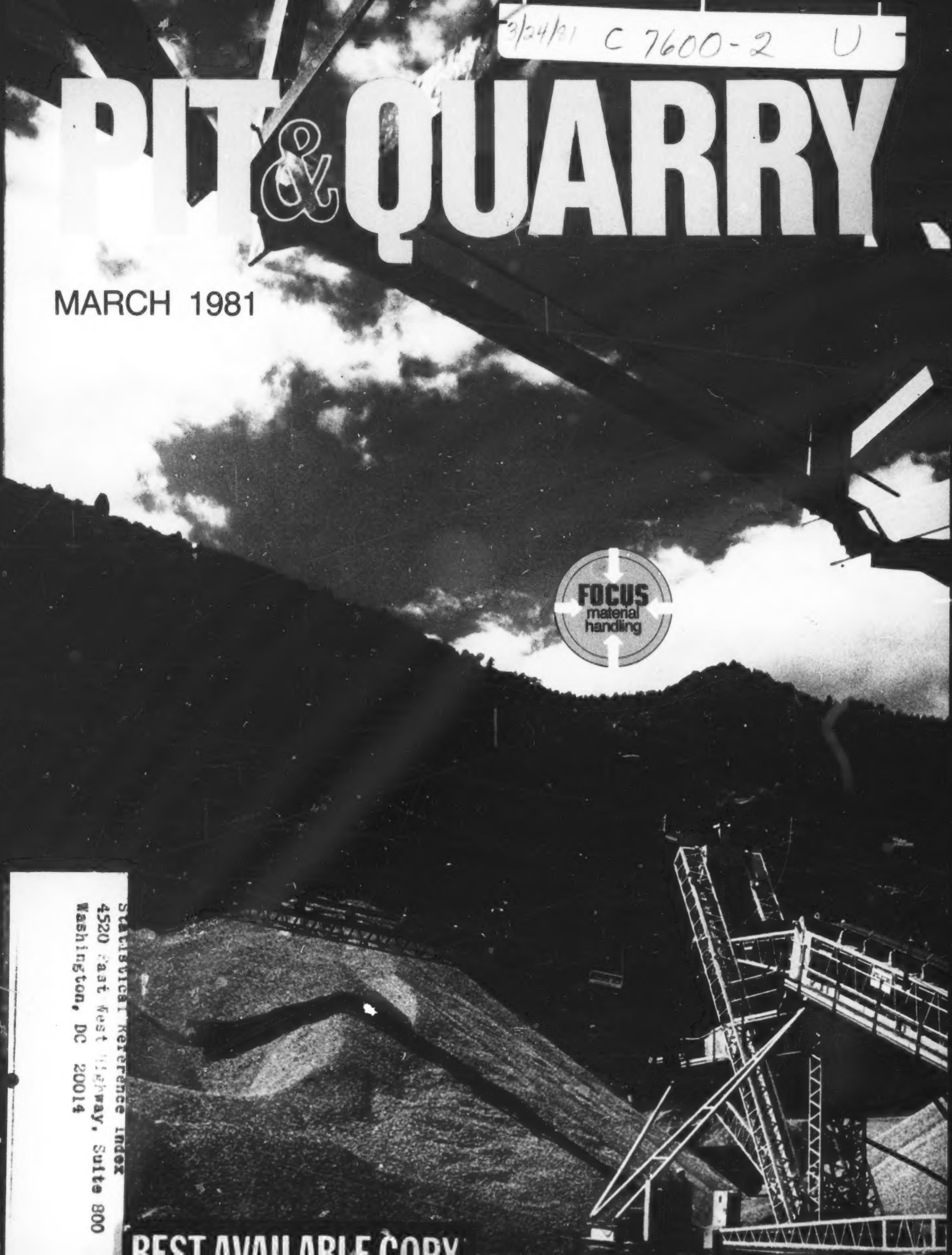
PIT & QUARRY

MARCH 1981



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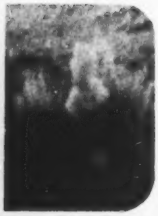
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ON THIS MONTH'S COVER

A major material handling system in the impressively revamped and expanded Morrison quarry operation of Cooley Gravel Co. See page 58. Staff photo.

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grew out of International Harvester's association with Bumar, the Polish Foreign Trade Enterprise with whom IH has had manufacturing licensee agreements for many years.

Earlier in 1980, IH purchased 50% equity in Mec-Track (Italy), manufacturer of crawler undercarriage parts. In January of this year, IH established another new company called Minter, a joint venture with the National Bank of Mexico. Minter will manufacture and market IH products in Mexico and export throughout Central America and South America.

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1980 Dec.	1979 Dec.	% Change
Nonresidential Building	$ 4,708.8	$ 3,428.4	+37
Residential Building	5,569.5	4,173.2	+33
Nonbuilding Construction	2,234.6	2,737.3	−18
Total Construction	$ 12,512.9	$ 10,338.9	+21

	1980 12 mos.	1979 12 mos.	% Change
Nonresidential Building	$ 52,344.9	$ 50,205.9	+ 4
Residential Building	63,206.0	74,557.5	−15
Nonbuilding Construction	31,612.9	43,682.5	−28
Total Construction	$147,163.8	$168,445.9	−13

DODGE INDEX

(1972 = 100, seasonally adjusted)

October, 1980 .... 167 November, 1980 .... 210 December, 1980 193

**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Bulldozer Noise Control Workshops Scheduled

The Bureau of Mines is sponsoring a series of free 1-day workshops on Bulldozer Noise Control. The workshops will run from April 7 through May 15 and are open to all mining industry personnel. All participants will receive a 250-page Bulldozer Noise Control manual.

Workshops will be held in Denver (Apr. 7); Salt Lake City (Apr. 10); Boise, Idaho (Apr. 13); Reno, Nev. (Apr. 15); San Francisco (Apr. 17); Los Angeles (Apr. 24); Phoenix (Apr. 27); Tucson (Apr. 28); Albuquerque (May 1); Oklahoma City (May 6); Dallas (May 8); Tampa, Fla. (May 12); and Washington, D.C. (May 15).

To obtain more information on the Bulldozer Noise Control workshops contact: Carol Prybylo, Bolt Beranek and Newman Inc., 50 Moulton St., Cambridge, Maine 02238.

Major Area Lime Producer Changes Name to Fit Role

Black River Mining Company, Butler, Ky., changed its name the

Do successful ripper operators really take the time and trouble to specify KELLEY

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APRIL 1981

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AND NEXT MONTH

New lime plant developments
Nonelectric delay blasting system helps U.S. Gypsum quarry safely at New Braunfels, Tex. site

ON THIS MONTH'S COVER

Several features in this issue focus on factors encountered in drilling and blasting. Appropriately, our cover depicts the initiation of a carefully planned quarry shot. Photo courtesy of the DuPont Co., Explosives Products Division.

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Lois Esmail Joins Staff As Circulation Director

We are pleased to announce that Lois G. Esmail has joined the staff of Pit and Quarry Publications, Inc. as circulation director. Lois was circulation manager for Kiver Publications from 1974.

L. G. Esmail

Prior to that, she was associated with Poole Brothers Printing Company for 10 years as circulation representative for all publications.

Lois, a member of the Business Publication Production Club, resides in Wilmette, Ill. She enjoys skiing and reading in her leisure time.

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1981 Jan.	1980 Jan.	% Change
Nonresidential Building	$ 4,122.0	$ 4,278.5	−4
Residential Building	4,206.6	4,055.3	+4
Nonbuilding Construction	2,138.7	2,606.7	−18
Total Construction	$ 10,467.3	$ 10,940.5	−4

DODGE INDEX

(1972 = 100, seasonally adjusted)

November, 1980	210
December, 1980	193
January, 1981	185

**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Change of Dates For SME-AIME Fall Meeting

The Society of Mining Engineers (SME) of AIME has announced a change in the dates of the 1981 SME-AIME fall meeting and international conference on caving and sublevel stoping to be held in conjunction with the fall meeting. The meeting will be held November 18-20, 1981, Denver, Colo., at Currigan Hall. It was originally scheduled for October.

Technical programming at the fall meeting will cover up-to-date developments in the fields of coal, industrial minerals, mining and exploration, mineral processing, and mineral economics.

A technology information exchange exhibit sponsored by the SME will feature displays of the latest products and services from manufacturing and equipment firms, consulting organizations, educational and research institutions, and government agencies.

Technical sessions of the international conference on caving and sublevel stopping include block caving, sublevel caving, sublevel

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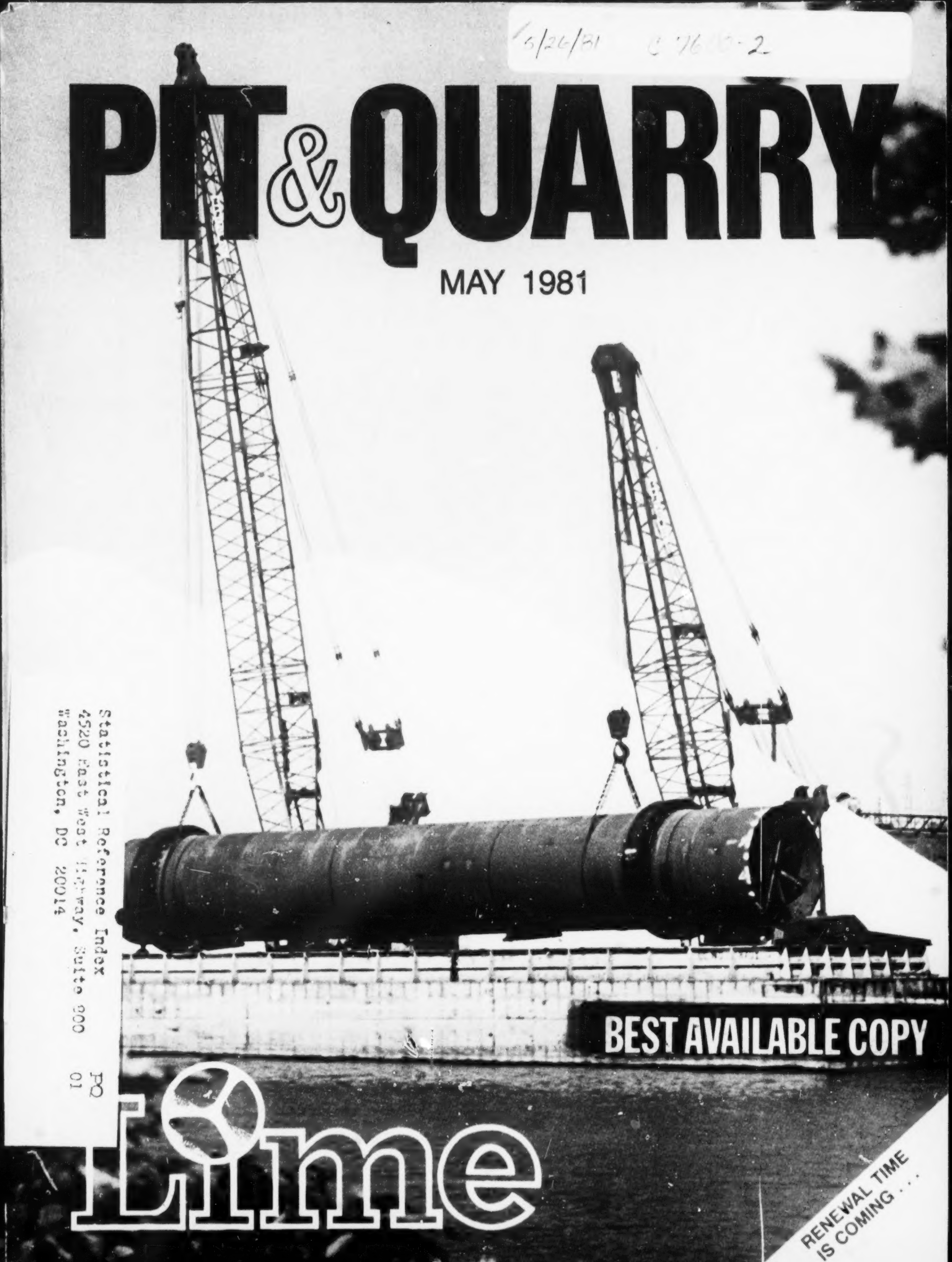

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Lime

RENEWAL TIME IS COMING . . .

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ON THIS MONTH'S COVER

One of the massive kiln segments for the world's largest single lime-producing rotary units required two 200-ton capacity cranes for off-loading from the barge at Marblehead Lime Co.'s South Chicago, Ill. plant.

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Aglime—a business, not a service

BY BRUCE W. REMICK
Director of Aglime Marketing
National Crushed Stone Association

If you were to ask prominent agriculturalists what they regard as the practices most essential to crop production, most would place the correction and maintenance of soil pH high on their list of priorities. Most of them also would agree that agricultural limestone probably is the most effective material available for that purpose.

The practice of liming is not new. In fact, the farmers of antiquity limed their soils because, although they may not have understood why, they observed that where they applied lime, crops seemed to grow better and the land yielded greater quantities of food. In terms of 20th century agriculture, excessive soil acidity has become widely recognized as a primary cause of reduced productivity. Where aglime has been properly used (it represents more than 90% of all liming materials used in the United States), it has resulted in significant benefits to the agricultural producer, in terms of increased productivity and income, at very low cost.

The cost efficiency and potential return which the farmer can realize by using aglime becomes readily apparent upon examination of existing yield data produced during research trials conducted at various U.S. locations.

For example, in a 4-year Ohio trial concluded in 1979 (Table 1), the total cumulative alfalfa yield produced in three aglime-treated plots averaged twice that produced in those plots where aglime was not applied. In a "real-life" situation, this added production would have represented an increased return to the alfalfa grower of from \$2.97 to \$10.20 per dollar spent on aglime whether he sold it or used it to feed his own herd. Because dry alfalfa hay contains 10-20% digestible protein, he also could have realized a savings from the reduction in purchases of protein feed concentrates.

In another 1975 Maryland trial designed to measure the effect of aglime and fertilizer on corn yields (Table 2), results clearly showed that they increased grain production, where applied individually, while each complimented the yield effect of the other when applied together.

In a series of field trials, conducted at 10 scattered southeastern U.S. locations from 1939 to 1964, cotton yield increases, averaging 502 lbs. per acre, were obtained by applying aglime. The unlimed soil pH for all locations averaged 5.1(1). Although this data may not be recent, the type of response described here is repeatable. Conclusions based on statistical evaluations of other aglime response data indicate that cotton will respond to aglime on many southern soils when the soil pH falls below 6.(2) In the above situation, on the basis of an average U.S. cotton price of 74½¢ per pound,(3) and with aglime costing \$15 per ton spread on the field at the rate of 2 tons per acre, the cotton producer, who achieves similar production increases under today's market conditions, should realize a net return increase of \$10 or more per dollar spent on aglime even if he charged his total aglime cost to the first crop following application.

Aglime makes sense

The preceding data are self-evident. Similar examples are plentiful. Each demonstrates that the application of aglime, when done on the basis of sound recommendations provided by accredited soil testing laboratories and in conjunction with other accepted crop production practices, makes good agronomic and economic sense.

Despite the recognized importance of liming to production agriculture, the total aglime tonnage applied in the United States historically has fallen critically short of that required nationally to maintain the pH of our agricultural soils at agronomically acceptable levels. The percentage actually used typically varies among states in any given year; the best estimates now available put actual usage at about 30 to 33% of the tonnage needed nationally to properly lime our agricultural soils. These figures have major significance for the U.S. aglime industry.

According to the U.S. Bureau of Mines, 1978 aglime loadings, "at the quarry" on a national basis, totaled 33.2 million tons.[4] This compares with a national annual need estimate of more than 90 million tons.[5] In effect, 57 million tons of aglime went unsold. At an average value of $3.14 per ton of aglime, F.O.B. the quarry, calculated from the above U.S. Bureau of Mines data, this additional 57 million tons could have represented $179 million in added 1978 sales if the U.S. aglime industry had chosen to go after the business. Unrealized aglime sales in 1979,[6] at a value of $3.53 per ton of aglime, totaled more than $200 million.

Obstacles to sales

These figures imply the existence of several negative factors in the marketplace which are contributing to low aglime acceptance and usage. Farmer attitude is a major negative factor. Although the use of fertilizer and agricultural chemicals has become an annual event on most U.S. farms, the application of aglime, even when the need is strongly indicated by soil analysis, is frequently carried out on a "if weather and time permit" basis only after other crop operations have been completed.

The results of fertilizer and agricultural chemical application usually appear during the crop year in which they are applied. The visible effects—in terms of crop growth, yield response, weed and insect control—satisfy the farmer's concern for immediate, tangible evidence of money spent. Aglime, on the other hand, breaks down and reacts slowly with the soil. Its effects may not appear for 1 to 2 years after application; crop response usually is not dramatic. But aglime, with its capability to neutralize soil acidity, to increase the effectiveness of high cost fertilizers and agricultural chemicals in the process, and to improve overall soil fertility, represents, under acidic soil conditions, one of the farmer's most cost effective means of increasing the productivity and profitability of his business.

The slow acting nature of aglime also is believed to affect its use on thousands of acres of rented crop land every year. Many farmers rent additional land as a means of increasing their production base without having to increase their indebtedness by purchasing more acreage. Some farm *only* on land under contract. Whichever category they are in, farmers renting land are frequently hesitant to spend operating capital on products, like aglime, particularly where short-term (1- and 2-year) rental agreements or contracts are involved. The shorter the term, the greater the tendency to use faster-acting fertilizer and liming materials and to apply them at lower rates. It has been estimated that from 40 to 60% of the crop lands in many of our major agricultural states, such as Ohio, Illinois, Iowa, and others, are under some form of rental agreement—a significant acreage which, most likely, is not being adequately limed.

From its inception in 1936 until the early 1970s, the Agricultural Conservation Program was a major factor in aglime usage. The agricultural use of limestone to neutralize soil acidity was encouraged and largely supported with federal cost-sharing funds provided through the ACP program. Because the conservation of soil and water resources always has been the stated objective of the ACP program, the use of aglime came to be associated with that objective as well; its value in crop production was de-emphasized. Although aglime's use on crop land qualified for cost-sharing in certain cases, eligibility still was based on use for conservation-related purposes. Since 1973, the program has gone through a series of revisions which limit cost-share eligibility for production-

Table 1—Total Yield and Return on Investment Effect of Aglime on Alfalfa Yield and Income

Soil pH after cropping	Lime applied 1974 (T/A)	Yield 12% H20 hay (T/A)	Yield increase over check (T/A)	Value of increased yield/a ($/A)	Cost of lime/b ($/A)	ROI Added Return Per $1.00 Spent on Aglime
5.	0	8.1				
5.6	2.5	14.1	6.	$420.00	$ 37.50	$10.20
5.[illegible]	5.	17.1	9.	630.00	75.00	7.40
6.	10.	16.6	8.5	595.00	150.00	2.97

/a Alfalfa at $70/T
/b Lime at $15/T

R.O.I.—Return on Investment

Source: John F. Trierweiler, Ohio State University

Table 2—Aglime-Fertilizer Interaction and Corn Yield Response

Plot	Yield Bus./Acre	Value of Corn (@) 2.75 Bu.	Fertilizer (1) Cost	Aglime Cost (2) @ $15/Ton (3 Year Period)	Value Over Untreated Plot	Net Return on Each Invested
1	22.7	62.43	none used	none used	0	0
2	98.7	271.43	$52.20	none used	$209.00	$3.00
3	47.5	130.63	none used	$10.00	68.20	5.82
4	114.1	313.78	$52.20	10.00	251.35	3.04

(1) Fertilizer cost for one year
(2) Aglime cost @ 2 tons/acre pro-rated over 3 years

Source: V. Allan Bandel, University of Maryland related practices. The Agricultural Appropriations Act of 1979, the umbrella legislation under which ACP falls, clearly excludes from eligibility all practices which are "primarily production-oriented or that result in significant economic benefits to the farmer or rancher".(7) The application of agricultural limestone to increase the production of corn, soybeans, cotton, and other commercial crops falls into this category.

Although discussion to this point has concerned national usage trends and statistics, you probably can identify one or more of the market factors described as having a direct effect on your aglime business. Barring unforeseen downturns in the agricultural economy, unfavorable weather, and other adverse factors which can affect farmer's decisions to buy aglime, the prevailing trend in aglime usage *can be reversed.* As a marketer of aglime, whether you are a producer or a vendor, you can do a lot in your market area to get the process started.

A business—not a service

Make product conveniently available. Vendors should inventory their aglime needs in advance of the spreading season to assure that they have the capability to deliver and spread as soon as weather and soil conditions permit. Those who do not have storage should set prearranged procurement and delivery schedules with the limestone quarries in their area. This will require giving the local quarry an estimate of your aglime needs by month or season so that it can adjust its production schedule to meet your needs. Where possible, encourage farmers to stockpile aglime on the farm. Thus, delivery will be assured and they can spread aglime as their work schedules permit. Spreading equipment should be kept in good running order and in proper adjustment so it will be ready to go when conditions are right.

Emphasize to your customers that aglime can be applied at any time of year. Some farmers tend to think the fall months are the only time to apply aglime. In fact, any time of year is suitable if weather and soil conditions permit. For example, the spring season is ideal for areas scheduled for seeding of legumes (especially alfalfa) in the fall of the current year or where soybeans will be planted a year from the present season.

Spread aglime properly. A job well done brings customer satisfaction and repeat business. Spread at the proper rate. Shortchanging the farmer on rate of application makes it impossible for aglime to achieve the desired result and undermines his confidence in the ability of aglime to resolve his soil acidity problems. Apply aglime uniformly. Uneven application can cost the farmer in uneven growth and yields and the dealer or vendor in valuable time spent in resolving customer complaints.

Sell aglime on its merits and do it with enthusiasm! Producer representatives talking to vendors, and vendors talking to farmers, should extol the value of aglime as an essential crop production tool with the capability to significantly increase not only crop growth and yield but farm income as well. Vendors, especially when discussing soil fertility with their customers, need to emphasize the economic returns possible with the proper application of aglime. Use state, county, or local data to prove your point.

Use every available channel to "get the message out" to your market. Aglime vendors can begin the educational process, during consumer meetings or annual appreciation dinners, by blocking out time on the program to talk about aglime. For added impact, invite someone from the agricultural college or Cooperative Extension Service to talk on the subject. Distribute aglime literature at these meetings, at other points of customer contact, including the vendor or dealer's place of business, by direct mail, and on customer calls. Emphasize the need for aglime at every opportunity. Remind farmers often of the harmful effects of soil acidity on soil productivity, fertilizer efficiency, herbicide effectiveness, and farm income.

Make effective use of the media (newspapers, radio, billboards, etc.) to promote aglime. Advertise in advance of, or during, the aglime spreading season. Producers, vendors, and full-supply dealers, when buying space in the local newspaper to promote fertilizer, agricultural chemicals, and seed, should give aglime equal emphasis in their advertising programs. Create demand by stressing benefits rather than price.

Work toward improvement in the format for land owner-renter contracts. Crop land under written or verbal contract probably constitutes a significant percentage of the agricultural acreage in many of the counties served by local aglime producers and their vendors. Short-term contracts discourage use of slow-acting crop production items, such as aglime, especially by renters who want to see a return on every dollar spent the year the expenditure is made. Increased contract length and terms favoring more equitable sharing of costs between land owner and renter can help open up what is likely a very significant aglime market in your area.

Sell aglime at a profit. By supplying and delivering aglime to the farmers in his area, the producer and/or vendor is performing a valuable service and should pay himself for doing so! Don't sell aglime as a "give away" item or as a loss leader. It is a product of value to production agriculture and should be sold on that basis. Producers and vendors who are not doing so may be missing a good market opportunity. ●

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1. Adapted from Chapter 4, American Society of Agronomy, Monograph No. 12, "Response to Lime in the Southern United States and Puerto Rico," by Fred Adams and Robert W. Pearson, 1967
2. *Crop Response to Aglime, A Statistical-Economic Evaluation,* Harry H. Hall, TVA Bul. No. Y-155, 1979
3. *Agricultural Prices,* Crop Reporting Board-ESS-USDA, February 27, 1981
4. *Stone in 1978,* Mineral Industry Survey, U.S. Bureau of Mines
5. Land Grant College data
6. Adapted from *Stone in 1979,* Mineral Industry Survey, U.S. Bureau of Mines
7. Agricultural Conservation Program, ASCS Bul. BI No. 10, July 1979

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plants and quarries with combined annual capacity of more than 4 million tons. They will become a part of Martin Marietta Aggregates Company's Southeast Div., which is headquartered in Raleigh, N.C.

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1981 Feb	1980 Feb	% Change
Nonresidential Building	$ 4,085.2	$ 3,484.6	+17
Residential Building	4,205.6	4,364.9	− 4
Nonbuilding Construction	2,114.4	2,333.1	− 9
Total Construction	$ 10,405.2	$ 10,182.6	+ 2
	1981 2 mos.	**1980 2 mos.**	**% Change**
Nonresidential Building	$ 8,193.6	$ 7,769.2	+ 5
Residential Building	8,402.8	8,416.8	− −
Nonbuilding Construction	4,211.6	4,936.6	−15
Total Construction	$20,808.0	$21,122.6	− 1

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**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Computer Controls Rotary Lime Kiln

A computerized rotary lime kiln control system at Louisiana Pacific's Somoa pulp mill near Eureka, Calif., has reduced natural gas consumption by at least 8%. Designed by Boeing Engineering and Construction Co. and installed in mid-1980, the system has met other goals, including improved process control, more uniform white liquor strength, more uniform precoat operation, and reduced stress on equipment due to high temperature peaks.

"As early as 1976 we could see that rapidly rising fuel costs would make development of a computer control system for rotary kilns economically feasible," explained Ray Bailey, process systems manager of Boeing's Energy Control Systems organization. "In many cases, the kiln is the largest user of natural gas in a pulp mill operation, and our studies indicate the computer system can pay for itself in two years."

The 8% savings figure at Louisiana-Pacific is derived from current use compared to last year's average. The savings are expected to be higher; the value will be known more exactly after a longer period of computer operation.

According to Fred Martin, technical director at Louisiana-Pacific, the temperatures in the kiln are more uniform and definitely lower than before the computer was installed. Hot lime exiting the kiln is just barely incandescent. Equipment and refractory is expected to last longer. Reduced temperature will ease thermal stress on all equipment exposed to hot lime.

"As was expected," said Martin, "fluctuations in liquor strength to the digester have been reduced, and we have noticed slightly less lime is needed to achieve normal liquor strengths because of improved temperature control in the slaker bowl."

Another benefit of computer control is flexibility in plant operation. Operating temperature can be turned for lime impurity levels. Production rate changes are much smoother. The computer provides a centralized display of important operating variables, and operator workload is substantially lower.

Con/Agg Preview

Manufacturers interested in exhibiting at the 1982 International Concrete and Aggregates Show, scheduled for February 7-11 in Las Vegas, recently had an opportunity to meet with the show staff and tour the Las Vegas Convention Center.

At a March preview, held at Caesar's Palace, associate members of the three co-sponsoring associations heard presentations concerning exhibit space, the computerized registration system, plans for national and international promotion of the biennial event, and services available to exhibitors.

William L. Carter, president of the National Crushed Stone Association, welcomed the prospective exhibitors on behalf of NCSA, the National Sand and Gravel Association, and the National Ready Mixed Concrete Association. The three industry groups co-sponsor the event every 2 years. In 1982, as in previous years, the show will be held conjointly with the associations' annual conventions. The exhibit attracts more than 20,000 visitors from every corner of the globe.

Co-chairmen of the Exhibit Committee are John E. Mahoney, P&H Harnischfeger, Milwaukee, Wis., and Harold E. Buckler, C. S. Johnson Co., Champaign, Ill. More information about Con/Agg 1982 is available from the Show offices at NRMCA/NSGA headquarters, 900 Spring St., Silver Spring, Md. 20910. Terry L. Peters is convention & exhibit coordinator.

ILPA Elects Schildberg President

John E. Schildberg, vice president of Schildberg Construction Co., Greenfield, Ia., has been elected president of the Iowa Limestone Producers Association. Jeff C. Roverud, secretary-treasurer of Roverud Construction Inc., Decorah, Ia., was named as president-elect. The appointments were made during the 36th annual convention held recently.

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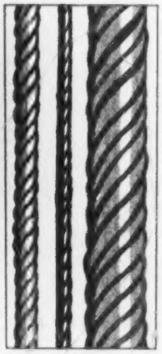
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AND NEXT MONTH

Our annual special section devoted entirely to new developments in the portland cement industry.

ON THIS MONTH'S COVER

After blasting in this oolitic limestone quarry in south Florida, shot rock is removed from lake bottom by dragline for feed to a barge-mounted crusher. Photo courtesy General Portland, Inc.

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Industry News

Kaiser Cement Plans Cushenbury Plant Expansion

Kaiser Cement Corp., Oakland, Calif., has awarded a contract to Kaiser Engineers, Inc., Oakland, a wholly owned subsidiary of Raymond International, for the modernization and expansion of its Cushenbury cement plant in southern California.

Kaiser Engineers will perform engineering, procurement and construction management for the $120-million modernization program, which will convert the existing 1-million-tpy wet process plant into a 1.5-million-tpy dry process plant.

Construction is underway with completion scheduled for the last quarter of 1982. Kaiser Engineers designed and built the original Cushenbury plant and a subsequent expansion which was completed in 1963.

Material Service Purchases Bridgeport Aggregates Inc.

Material Service Corp., Chicago, has purchased the assets of Bridgeport Aggregates Inc., Bridgeport, Tex. Material Service, a subsidiary of General Dynamics Corp., will operate the Texas plant under the name of Metroplex Stone Corp.

G. R. Nagel, senior vice president-sales of Material Service, has been named president of Metroplex. He will continue to make his headquarters in Chicago. Gene C. Marter will become vice president and general manager of Metroplex, and John Halloran has been named plant superintendent. Both will be headquartered in Bridgeport.

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1981 March	1980 March	% Change
Nonresidential Building	$ 5,345.4	$ 4,052.6	+32
Residential Building	5,929.0	4,434.9	+34
Nonbuilding Construction	2,629.8	2,457.7	+ 7
Total Construction	$ 13,904.2	$ 10,945.2	+27
	1981 3 mos.	**1980 3 mos.**	**% Change**
Nonresidential Building	$13,448.1	$11,847.2	+14
Residential Building	14,376.0	12,852.0	+12
Nonbuilding Construction	6,801.9	7,394.0	− 8
Total Construction	$34,626.0	$32,093.2	+ 8

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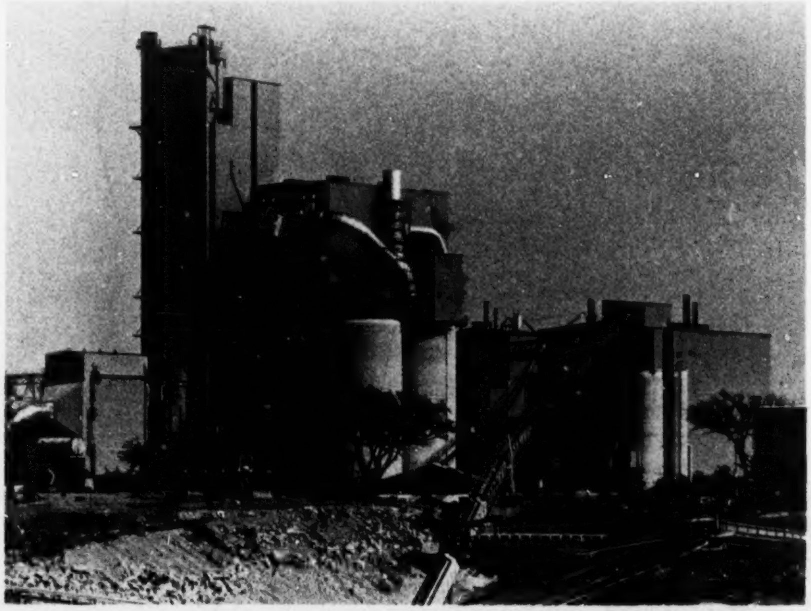
(1972 = 100, seasonally adjusted)

January, 1981 .... 185 February, 1981 .... 177 March, 1981 183

**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*



• Marquette Co.'s new $102-million cement plant in Cape Girardeau, Mo., went into production April 27. The 1-million-tpy facility will enable Marquette to service customers throughout the Mississippi, Ohio and Cumberland River valleys. Cement made at the new plant will be barged to Marquette distribution terminals in Nashville and Memphis, Tenn.; Paducah, Ky.; and St. Louis, Mo.

Work injuries summarized in preliminary U.S. Labor report

Table 1.—Number of injuries, injury-incidence rates per 200,000 employee-hours, average number of workers, and employee-hours, by mineral industry and work location, January-December, 1980

Mineral Industry and Work Location	Fatal	Fatal Incidence Rate	NFDL	NFDL Incidence Rate	NDL	NDL Incidence Rate	All Occurrences	All Incidence Rate	Average Number of Workers	Employee-Hours Reported
Underground Mines										
Metal	18	.08	2,461	10.27	1,482	6.18	3,961	16.52	27,276	47,949,130
Nonmetal	5	.07	504	6.56	238	3.10	747	9.73	8,858	15,357,508
Stone	—	—	134	6.21	26	1.21	160	7.42	2,296	4,312,595
Total, underground mines	23	.07	3,099	9.17	1,746	5.16	4,868	14.40	38,430	67,619,233
Surface Mines										
Metal	8	.03	958	3.85	556	2.23	1,522	6.11	27,044	49,829,056
Nonmetal	5	.05	288	2.73	181	1.72	474	4.49	12,263	21,103,273
Stone	22	.07	1,352	4.12	552	1.68	1,926	5.88	37,494	65,559,014
subtotal, surface mines	35	.05	2,598	3.81	1,289	1.89	3,922	5.75	76,801	136,491,343
Sand and gravel	15	.05	893	3.06	357	1.22	1,265	4.33	39,562	58,389,372
Total, surface mines	50	.05	3,491	3.58	1,646	1.69	5,187	5.32	116,363	194,880,715
Total, mines	73	.06	6,590	5.02	3,392	2.58	10,055	7.66	154,793	262,499,948
Mills										
Metal	3	.01	1,295	4.20	881	2.86	2,179	7.07	33,674	61,678,996
Nonmetal	8	.04	1,090	4.86	489	2.18	1,587	7.07	24,490	44,901,773
Stone	19	.04	1,957	4.31	785	1.73	2,761	6.09	46,487	90,707,999
Total, mills	30	.03	4,342	4.40	2,155	2.18	6,527	6.62	104,651	197,288,768
Independent Shops and Yards										
Metal	—	—	44	3.44	33	2.58	77	6.03	1,223	2,555,176
Nonmetal	—	—	—	—	—	—	—	—	13	20,934
Stone	—	—	10	4.16	9	3.74	19	7.90	214	481,218
Total, shops and yards	—	—	54	3.53	42	2.75	96	6.28	1,450	3,057,328
All Mines, Mills and Shops										
Metal	29	.04	4,758	5.87	2,952	3.64	7,739	9.55	89,217	162,012,358
Nonmetal	18	.04	1,882	4.63	908	2.23	2,808	6.90	45,624	81,383,488
Stone	41	.05	3,453	4.29	1,372	1.70	4,866	6.04	86,491	161,060,826
subtotal	88	.04	10,093	4.99	5,232	2.59	15,413	7.62	221,332	404,456,672
Sand and Gravel	15	.05	893	3.06	357	1.22	1,265	4.33	39,562	58,389,372
Total, mines/mills/shops	103	.04	10,986	4.75	5,589	2.42	16,678	7.21	260,894	462,846,044
Officeworkers										
Metal	—	—	13	.11	15	.13	28	.24	12,568	23,512,297
Nonmetal	—	—	3	.05	8	.12	11	.17	7,431	13,023,160
Stone	—	—	11	.09	2	.02	13	.11	12,488	23,817,840
Sand and gravel	—	—	10	.23	1	.02	11	.25	6,007	8,744,308
Total, officeworkers	—	—	37	.11	26	.08	63	.18	38,494	69,097,605
Summary Total (includes office-workers)										
Metal	29	.03	4,771	5.14	2,967	3.20	7,767	8.37	101,785	185,524,655
Nonmetal	18	.04	1,885	3.99	916	1.94	2,819	5.97	53,055	94,406,648
Stone	41	.04	3,464	3.75	1,374	1.49	4,879	5.28	98,979	184,878,666
subtotal	88	.04	10,120	4.35	5,257	2.26	15,465	6.65	253,819	464,809,969
Sand and gravel	15	.04	903	2.69	358	1.07	1,276	3.80	45,569	67,133,680
Grand Total	103	.04	11,023	4.14	5,615	2.11	16,741	6.29	299,388	531,943,649

A preliminary report, compiled by the U.S. Department of Labor, Mine Safety and Health Administration, reveals the incidence and severity of worker injuries in the national mining industries for 1980.

Data, presented in a report dated December 1980, were compiled from reports by operators of mines, and deal with personnel directly engaged in production, cleaning, milling, shipping, development, and maintenance and repair work, including direct supervisory and technical personnel, and those involved in contract mining services. These reports are required under the Federal Mine Safety and Health Act of 1977.

The term "injury" includes all reportable occupational injuries and illnesses resulting from a work accident, or exposure, involving a single incident in the work environment. A reportable

(continued on page 107)

Table 2.—Number of injuries by mineral industry, work location, and accident classification, January-December, 1980

Accident Classification	Nonmetal									Stone									Sand and Gravel		
	Underground			Surface			Mills			Underground			Surface			Mills			Surface		
	Fatal	NFDL	NDL	Fatal	NFDL	NDL	Fatal	NFDL	NDL	Fatal	NFDL	NDL	Fatal	NFDL	NDL	Fatal	NFDL	NDL	Fatal	NFDL	NDL
Electrical	—	14	1	—	3	—	—	7	4	—	—	1	3	16	7	4	19	6	3	16	3
Entrapment	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Exploding vessels under pressure	—	1	2	—	1	—	—	8	1	—	2	1	—	3	—	—	3	2	—	4	1
Explosives and breaking agents	1	4	4	—	—	—	—	1	—	—	—	—	2	9	1	—	—	—	—	—	—
Falling, rolling, or sliding material	—	9	2	—	1	1	—	17	6	—	1	—	2	10	3	3	24	6	2	11	3
Fall of face, rib, side or highwall	—	5	3	—	—	—	—	—	—	—	3	1	—	6	1	—	2	—	—	1	—
Fall of roof (underground mines only)	1	21	9	—	—	—	—	—	—	—	8	—	—	—	—	—	—	—	—	—	—
Fire	—	—	2	—	—	—	1	4	—	—	1	—	—	4	4	—	3	1	—	4	1
Handling material	—	152	68	—	96	52	2	466	182	—	36	9	1	437	189	2	685	284	—	323	104
Hand tools	—	54	53	—	34	48	—	81	106	—	17	6	—	157	123	—	259	185	—	109	76
Nonpowered haulage	—	2	—	—	2	2	—	7	2	—	—	—	—	5	1	—	22	7	—	1	—
Powered haulage	—									—											
haulage trucks	—	5	1	1	13	3	—	6	4	—	7	—	1	81	21	1	32	9	2	27	7
front-end loaders	—	7	2	—	3	—	1	14	2	—	—	—	5	26	7	1	13	1	1	19	5
all other powered haulage	—	39	16	1	13	5	2	75	20	—	6	1	2	42	16	2	93	25	3	41	12
Hoisting	1	6	4	—	1	—	—	3	—	—	—	—	—	—	—	—	4	2	—	1	—
Ignition or explosion of gas or dust	—	2	—	2	1	—	—	10	1	—	—	—	1	4	—	1	12	6	1	6	2
Impoundment	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Inundation	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Machinery										—											
dozer	1	2	—	—	2	1	—	1	1	—	—	—	1	8	4	—	2	—	—	4	4
drill	—	3	6	—	4	1	—	—	—	—	3	—	1	20	7	—	—	—	—	1	—
all other machinery	—	78	35	1	27	36	—	74	63	—	16	2	1	137	72	2	217	122	1	99	63
Slips or falls of Person	—	74	17	—	75	22	2	240	62	—	24	5	1	316	66	3	431	88	2	196	46
Stepping or kneeling on object	—	18	5	—	5	2	—	34	1	—	7	—	—	50	22	—	75	19	—	18	10
Striking or bumping	—	2	5	—	1	3	—	13	8	—	1	—	—	11	4	—	14	6	—	3	4
Other	—	6	3	—	6	5	—	29	26	—	2	—	1	20	13	—	47	16	—	9	16
Total	5	504	238	5	288	181	8	1,090	489	—	134	26	22	1,362	561	19	1,957	785	15	893	357

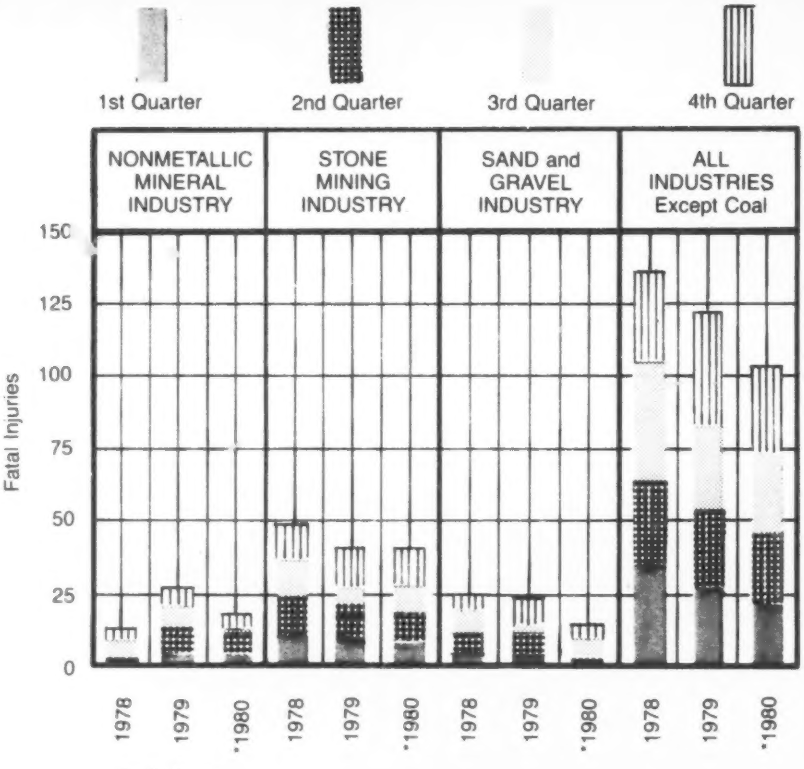
(continued from page 103)

"injury" occurring at a mining operation requires medical treatment, or results either in death, loss of consciousness, the inability to perform all job duties on any workday after the injury, a temporary assignment to other duties, or transfer to another job.

Injury occurrences are classified, according to severity, into three groups as follows: Fatal; NFDL: non-fatal occurrences resulting in workdays lost; and NDL: occurrences with no days lost, resulting in medical treatment other than first aid.

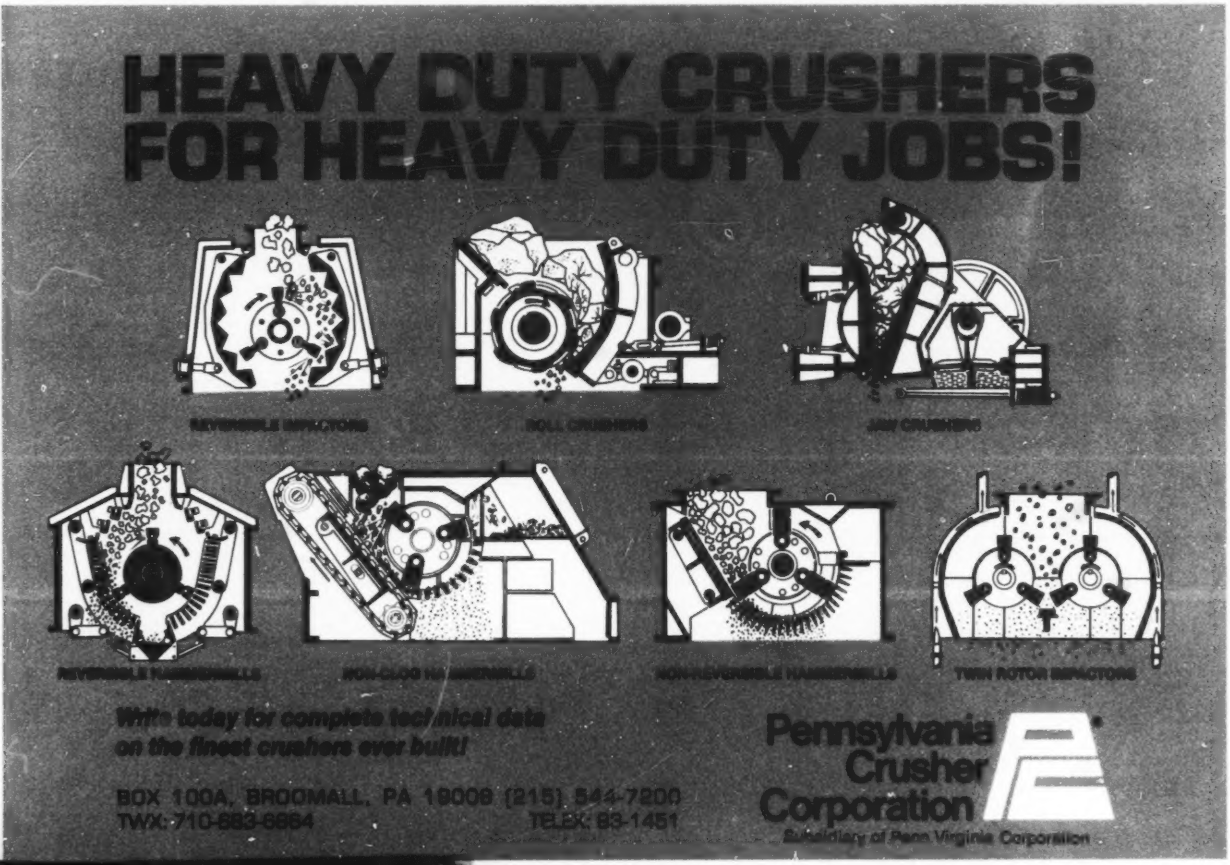
Incidence rates (which represent the number of injuries that occurred for each 200,000 employee-hours worked) are computed by dividing the number of injury occurrences by the number of employee hours and then multiplying the result by 200,000. If the computation is less than .005, an asterisk appears in the chart.

"Average number of workers" represents the number of workers at individual mining establishments during periods (not necessarily continuous) of active operations. ●



**Preliminary*

Chart 1.
Number of FATAL INJURIES in the U.S. Mining Industries in each quarter of 1978, 1979 and 1980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Cement reports

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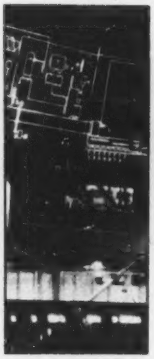
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AND NEXT MONTH

Special reports will feature fuels, their conservation, and fuel-efficient engine oils relative to mobile equipment.

ON THIS MONTH'S COVER

A mirror-image view of General Portland's impressive new Balcones plant at New Braunfels, Tex.; the plant features the first preheater/precalciner kiln system in the firm's extensive chain of cement manufacturing facilities. ***Photo courtesy General Portland.***

Errata: **The May 1981 Vol. 73 No. 11 issue of Pit & Quarry was identified, on the contents page, as April 1981 Vol. 73 No. 10.**

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Industry News

New Sales Record Set For 1982 Con/Agg Show

Although the 1982 International Concrete & Aggregates Show is months away, 185 exhibitors have applied for 218,000 net sq. ft. of exhibit space.

"Never before in the 53-year history of the Con/Agg Show has exhibit space been snapped up at so fast a rate," reported Vincent P. Ahearn Jr., exhibit manager. "Our 1980 show was our biggest ever, with exhibitors occupying 233,575 net sq. ft. Yet ten months before that show we hadn't sold as much space as we have now sold for our 1982 show. If the present trend continues, our 1982 show will break all records."

Manufacturers who have not yet signed up for exhibit space are being urged to act promptly. Exhibitor kits were scheduled for mailing early this month. Further information is available from Vincent P. Ahearn Jr., exhibit manager, 1982 International Concrete & Aggregates Show, 900 Spring St., Silver Spring, Md. 20910.

Robert Koch Named LICA Honorary Lifetime Member

The Land Improvement Contractors of America (LICA), presented an LICA Honorary Lifetime Membership award to Robert M. Koch, retired president of the National Limestone Institute. Koch was widely recognized throughout the agricultural and soil conservation communities for his support of the nation's Agricultural Conservation Program. Only five other similar awards have been made in the 30-year history of the LICA.

NSGA Operator's Forum Set for August 9-12

Practical operating topics and plant tours will be the theme of the 1981 Sand and Gravel Operator's Forum Sunday, August 9 through Wednesday noon, August 12, sponsored by the National Sand and Gravel Association. This meeting will be of interest to both aggregate plant operating personnel and sand and gravel executives. The location of the meeting this year is the Toronto-Airport Holiday Inn. Sessions and discussion will be at the hotel, with all day Tuesday devoted to tours of a number of sand and gravel and aggregate operations in Ontario. The Ontario Aggregate Producers Association is organizing the tours.

The Toronto meeting starts Sunday evening with a reception and new products session. The program on Monday includes plant design, crushing, screening material, computerized plant control, and recycling techniques for wash water. Tours of five aggregate operations are scheduled for Tuesday. The concluding session Wednesday morning includes energy conservation, reducing plant downtime, and the economics of equipment maintenance. Further information is available from the National Sand and Gravel Association, Engineering Div., 900 Spring St., Silver Spring, Md., 20910.

Flintkote Stone Products Name Changed to Genstar

Flintkote Stone Products Co. became Genstar Stone Products Co. July 1. Headquartered in Hunt Valley, Md., the Flintkote Co. division became a wholly owned subsidiary of Genstar Limited in early 1980.

Jack A. West, who has served as

COMPARISON OF MONTHLY/YEAR-AGO CONSTRUCTION CONTRACT VALUES*

	1981 April		Seasonally-Adjusted % Change from Previous Month
Nonresidential Building	$ 5,271.6		− 6%
Residential Building	6,569.4		− 4
Nonbuilding Construction	2,537.2		−12
Total Construction	$14,378.2		− 6%
	1981 4 mos.	**1980 4 mos.**	**Cumulative % Change**
Nonresidential Building	$18,612.1	$15,720.0	+18
Residential Building	20,979.3	17,191.9	+22
Nonbuilding Construction	9,266.1	10,019.7	− 8
Total Construction	$48,857.5	$42,931.6	+14

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(1972 = 100, seasonally adjusted)

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**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

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Section cover courtesy: General Portland

Cement report

Cement in the People's Republic of China

BY SID LEVINE

The People's Republic of China apparently has begun a long-term program to upgrade the technological level of its cement industry. The first cement research team to come to the United States from China visited earlier this year several large cement plants, major process equipment suppliers, and the research and development division of the Portland Cement Association in Skokie, Ill. (Fig. 1).

The four-member team visited the United States under provisions of a United Nations fellowship grant. The program was arranged by the U.S. Department of Labor. During their month's stay in March, team members familiarized themselves with the current status of the North American cement industry and studied future trends.

According to a U.S. Bureau of Mines estimate, about 3,000 very small vertical-kiln cement plants, operating in municipalities and communes throughout China, account for more than half of total production. The research team confirmed this estimate and said about 60 wet-process plants (200,000 mtpy or more) currently are in operation. The CEMBUREAU'S "World Cement Directory" lists the location of 35 rotary-kiln plants in China with estimated annual clinker capacities from 100,000 to 1 million mtpy in 1979. (Fig. 2).

Cement production in mainland China amounted to 80 million metric tons last year, according to the study group, making that country the world's third largest producer. (The United States shipped, in 1980, an estimated 69 million metric tons.) Because of the many outmoded vertical kilns scattered throughout the country, the Chinese are concerned about controlling the quality and uniformity of the product. Blending and mixing ce-

Fig. 1 (Left-to-right) Messrs. Chang-Ming Gao, Zu-pei Zhu, Pei Zhang, and Tao-Pkng Li, the four-member team of cement specialists from the People's Republic of China, listen attentively as Douglas V. Parmenter, process simulator trainer-systems engineer at Fuller Co., Bethlehem, Pa., explains how the simulator realistically depicts control room conditions found at an operating cement plant. *(Courtesy: Fuller Co.)*

ments of different grades from various locations can affect the quality of the final product. In addition, the study group noted, China is experiencing a severe cement shortage.

To help relieve this situation, a large cement-development center in Tianjin, approximately 50 miles east of Beijing (Peking), is being built. At present, only a research laboratory has been built, but the entire complex has been planned to include 130,000 sq. ft. of building space. It is expected that 1,000 technicians, engineers, and support personnel will be employed there.

The small-scale, vertical-kiln plants probably were used in China because of the government's development policy rather than for production economics reasons. The policy decentralizes production and creates rural self-sufficiency wherever possible. Such a policy favor small cement plants in rural agricultural areas, financed by capital raised at a regional or commune level, and including equipment built in local workshops by a locally trained work force.

The small plants, because of their low level of technology, are an excellent way to introduce industry and technology into underdeveloped areas. Most of the cement produced by these small plants, however, is poor in quality and suitable only for low-strength agricultural and rural construction projects such as irrigation canals, culverts, houses, farm structures, and concrete poles. The small plants, therefore, contribute greatly to water conservation and rural construction efforts.

The high rate of growth in China's cement industry in recent years has come largely from the rapid expansion of the small-plant sector. In 1964, for example, small plants accounted for only 20% of national output. By 1971, their share had doubled and, by 1976, had jumped to 60% of total production. Small-plant expansion has resulted in an impressive 18.6% average annual rate of increase in small-plant production during the last decade, treble the rate set by the country's modern plants. Average capacity of the small-shaft kilns has been estimated at 10,000 mtpy.(Ref. 3)

Instead of continuing the program to build hundreds of additional small plants, the Chinese apparently are attempting to upgrade the technical level of those already in place. They reportedly have begun to replace vertical kilns with small rotary kilns, thus increasing the output of higher quality cement while using the same amount of raw materials.

The concentration of the cement industry in China is gradually spreading south and west from the heavily industrialized north and east. The bulk of the modern plants traditionally have been located in the northern and eastern regions, but this concentration is shifting to the south. Fragmentary data indicate that the north and east accounted for

Large* (rotary kiln) cement plants in the People's Republic of China

Location Code No.	Plant Location	Estimated Annual Clinker Capacity (metric tons)
1	Handan, Hopeh	1,000,000
2	Yao Hsien, Shensi	1,000,000
3	[illegible], Hupeh	1,000,000
4	Kwangchow, Kwangtung	700,000
5	Tangshan, Hopeh	700,000
6	[illegible], Peking	700,000
7	[illegible], Kansu	600,000
8	Fushun, Liaoning	550,000
9	Chungking, Szechuan	550,000
10	Tatung, Shansi	500,000
11	Kiangshan, Chekiang	500,000
12	[illegible] (Changchun), Kirin	440,000
13	[illegible], Kirin	400,000
14	[illegible], Kiangsu	400,000
15	Liuchow, Kwangsi	400,000
16	Kunming, Yunnan	350,000
17	Urumchi (Uighur) Sinkiang	300,000
18	Kweiyang, Kweichow	300,000
19	[illegible] (Lishu) Kirin	300,000
20	Chaohu (Hofei), Anhwei	300,000
21	Kungyuan (Penchi), Liaoning	300,000
22	Kaiyuan, Yunnan	270,000
23	Changchou, Kiangsu	270,000
24	Chiangnan (Shanghai) Kiangsu	250,000
25	Yungan, Fukien	250,000
26	[illegible], Szechuan	200,000
27	Lüta (Dairen), Liaoning	200,000
28	Tzupo, Shantung	180,000
29	Anshan, Liaoning	100,000
30	Chinhsi, Liaoning	100,000
31	Harbin, Heilungkiang	100,000
32	Liaoyang, Liaoning	100,000
33	[illegible], Honan	100,000
34	Wusung, Kiangsu	100,000
35	Nanping, Fukien	100,000

*Estimated annual clinker capacities from 100,000 to 1,000,000 metric tons per year, end of 1979.

Source: "World Cement Directory: 1980," CEMBUREAU—The European Cement Association (France)

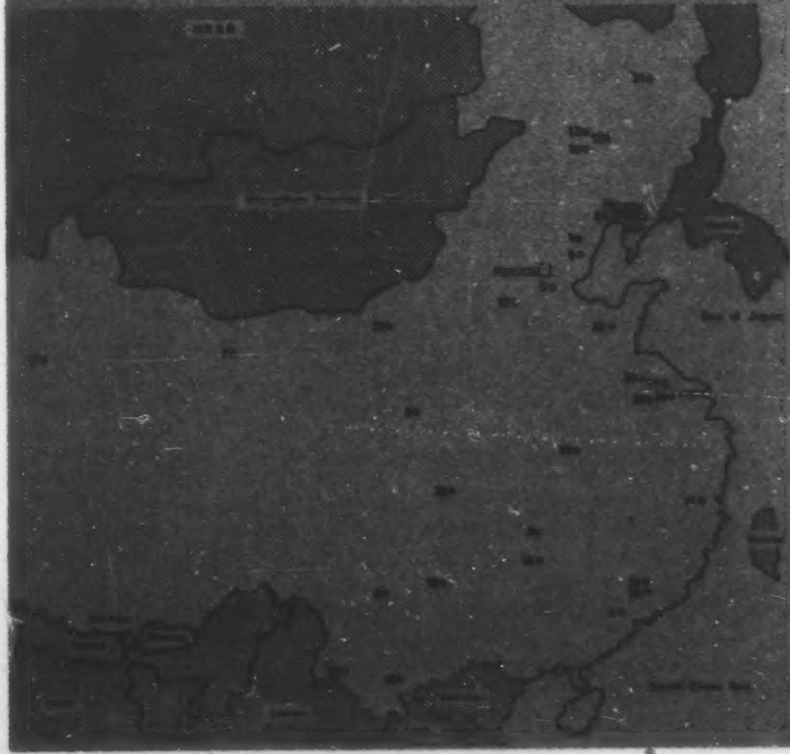

Fig. 2-A & 2-B. Large (rotary kiln) cement plants in the People's Republic of China.

an estimated 56% of national capacity in 1966 and just over 50% in 1975. At the same time, the proportion of national capacity located in the south and southwest jumped from an estimated 35% in 1966 to about 42% in 1975. Sichuan (Szechwan) province in southwest China currently has the largest cement capacity of any province in China, a distinction formerly held by Liaoning province in the northeast.

Modern-plant production has fallen well behind the small-plant sector despite considerable expansion of capacity in the last decade. In 1976, modern plants produced an estimated 20 million tons, or 40% of national output; this represents a decline from the 60% produced in 1971. Output grew at a moderate 6.7% average annual rate in the third Five-Year-Plan (1966-70), but declined sharply to only 4.4% during 1971-76. Lagging modern-plant output directly affects several important sectors of the economy because modern plants supply almost all the better quality cement used in high-priority military projects, heavy industry, and urban housing.

The falloff may be attributed partly to a shift from large rotary kilns, erected in the early part of the expansion program, to much smaller kilns. Contrary to world practices, which favor kilns with capacities of more than 500,000 tons, the Chinese build kilns that average considerably less. The Chinese reportedly have adopted standard-sized rotary kilns of 30,000- to 200,000-ton capacity; the most prevalent new kilns are of the relatively small 60,000-ton capacity.

A shift back to larger-kiln plants began several years ago. As noted in PIT & QUARRY's January 1981 international cement survey,[Ref. 6] China's Technical Import Corp. has awarded contracts for a 2,000-mtpd plant at Xuzhou (1978), a 4,000-mtpd plant at Tangshan (1979), and a 4,000-mtpd plant in Anhui province. Cement plant operations are conducted by the China National Metals and Minerals Import and Export Corp.

China's primary foreign market

Cement Production

	Output (Million Metric Tons)			Output From Small Plants as a Percent of Total[a]	Exports (Million Metric Tons)
	Total	Modern Plants	Small Plants		
1949	0.66	0.66			
1950	1.41	1.41			
1951	2.49	2.49			
1952	2.86	2.86			
1953	3.88	3.88			0.3
1954	4.60	4.60			0.3
1955	4.50	4.50			0.4
1956	6.39	6.39			0.8
1957	6.86	6.86			1.2
1958	10.7	9.3	1.4	13	0.9
1959	12.3	10.6	1.7	14	0.8
1960	12.0	9.0	3.0	(25)	0.8
1961	7.8	6.0	1.8	(23)	1.0
1962	6.9	5.3	1.6	(23)	1.1
1963	9.1	6.8	2.3	(25)	0.9
1964	10.9	8.7	2.2	20	0.7
1965	16.3	10.9	5.4	33	1.0
1966	17.9	12.5	5.4	(30)	1.0
1967	14.2	10.6	3.6	(25)	0.5
1968	19.6	13.7	5.9	(30)	0.3
1969	22.5	14.4	8.1	(36)	0.3
1970	26.5	15.1	11.4	(43)	0.3
1971	30.9	18.5	12.4	40	0.6
1972	38.0	19.8	18.2	48	0.7
1973	40.8	20.4	20.4	50	1.0
1974	37.3	16.1	21.2	(57)	1.0
1975	46.9	19.3	27.6	59	1.3
1976	49.1	19.6	29.5	60	1.5

[a] Figures in parentheses are estimated on the basis of fragmentary data. Other figures are reported or derived from reported data.

Fig. 3. Cement production in the People's Republic of China: 1949-1976. Reference No. 1

Distribution of Cement Production Capacity

	1965	1970	1975
Total	100%	100%	100%
Northeast	22	17	17
North	14	16	13
East	30	18	21
Central and South	16	15	20
Southwest	12	27	22
Northwest	6	7	7

Fig. 4. Distribution of cement production capacity. Reference No. 1

Distribution of Small Cement Plants

	1972	1976
Total[a]	2,400	3,000
Provincial totals[a]	2,295	2,894
Northeast	266	266
Heilungkiang	47	47
Kirin	117	117
Liaoning	102	102
North	604	610
Hopeh	129	129
Inner Mongolia	40	40
Shansi	225	225
Shantung	210	216
East	436	436
Anhwei	77	77
Chekiang	80	80
Fukien	59	59
Kiangsi	127	127
Kiangsu	93	93
Central and South	373	645
Honan	100	140
Hunan	2[b]	196
Hupeh	9[b]	9[b]
Kwangsi	112	110
Kwangtung	150	190
Southwest	170	432
Kweichow	NA[c]	25
Szechwan	84	320
Tibet	2	3
Yunnan	84	84
Northwest	446	505
Kansu	77	69
Ninghsia	24	24
Shensi	307	307
Sinkiang	37	88
Tsinghai	1	17

[a] Total represents the number of small cement plants nationwide that was reported in the Chinese press. Provincial statistics were derived from provincial press reports.

[b] Minimum number. No provincial total was reported.

[c] Not available.

Fig. No. 5. Distribution of small cement plants. (Reference No. 1)

Cement Exports to Hong Kong

	Thousand Metric Tons
1970	211
1971	365
1972	468
1973	539
1974	444
1975	469
1976	461

Fig. No. 6. Chinese cement exports to Hong Kong (Reference No. 1)

for cement is Hong Kong. All cement needed in this British Crown Colony must be imported, either in the form of finished product, or as clinker which is milled in the colony. The government is a partner in a consortium with Kaiser Cement in the construction of a new cement plant in Hong Kong.(Ref. 4)

Because Kaiser Cement had been actively involved in the cement business in Asia since 1965, the company had studied the prospects of the Hong Kong market for a number of years. Early in 1978, Kaiser learned a major new power plant was to be built through a joint venture of China Light & Power Co. of Hong Kong and a subsidiary of Exxon Corp. Since the power plant would produce a by-product suitable for cement manufacture, and since use of the fly ash by-product would solve a costly environmental disposal problem for the power plant, the idea of a cement-producing plant to serve Hong Kong's expanding construction market was born.

After more than a year of study, planning, and negotiations, China Cement Co. (Hong Kong), Ltd., was founded in mid-1979 to construct and operate a 1.5 million ton cement plant on a waterfront site in the New Territories; the latter is an area of Hong Kong leased in 1898 for 99 years from China by the Crown Colony. The $220-million project, for which the major equipment is on order, is scheduled for completion in mid-1982.

The completion date will approximate that of the adjacent power plant with which China Cement has a long-term supply contract for fly ash. Limestone and other raw materials, along with coal to fuel the cement plant, will be imported.

China Cement is owned by a subsidiary of Kaiser Cement (40%) and by Forward Industrial Co., Ltd., a consortium of prominent Hong Kong investors, and the People's Republic of China (60%). Kaiser International Services Corp., also a subsidiary of Kaiser Cement, has a long-term contract to manage China Cement and to construct and operate the cement plant.

The three partners in Forward Industrial, each with equal interests, are Cheung Kong (Holdings), Ltd., a development company in Hong Kong, Kiu Yip

Plant Visit Itinerary:
Tijeras, N.M. plant, Ideal Basic Industries, Inc.
Ragland, Ala. plant, National Cement Co.
Knoxville, Tenn. plant, Ideal Basic Industries, Inc.
Theodore, Ala. plant, Ideal Basic Industries, Inc.
Cape Girardeau, Mo. plant, Marquette Cement Co.
New Braunfels, Tex. plant, General Portland, Inc.

Manufacturers' Seminars:
Fuller Co., Catasauqua, Pa.: Training program to familiarize study group with research conducted into raw materials, chloride testing, grate clinker-cooler design, preheater and precalcining systems and related processes.
Allis-Chalmers, Milwaukee, Wisc.: Training program for study of advances in cement technology, cement testing, use of low grade raw materials, alkali bypass design, and other relevant manufacturing processes.
Portland Cement Association, Skokie, Ill.
Program included sessions on the association's research and development projects in cement technology and involved discussions with technical specialists.

Visit of the cement research team of the People's Republic of China (March 1981). Sponsored by the United Nations, Department of Technical Co-operation for Development. Program arranged by the United States Department of Labor, Bureau of International Labor Affairs.

Study Group Participants:
Pei Zhang, President of Modernization, Ministry of Building Materials Industry.
Tao-Ping Li, Director and Vice Chief Engineer, Cement Development Center, (projected institute of cement industry).
Chang-Ming Gao, Engineer in Charge, Cement Development Center, (projected institute of cement industry).
Zu-Pei Zhu, Chief Engineer, Cement Development Center, (projected institute of cement industry).
Team Escort: Aly Moussa Afify, Chairman, Alexandria Cement Co., Egypt
Visit Objective: Study cement technology including the following:
(a) present status and development trends of the cement industry in the U.S.A.
(b) organization and management of cement development centers, their activities, and how the activities relate to the manufacturing sector.
(c) testing methods on the characters of cement raw material and coal;
(d) use of low-grade raw material in the RSP (precalciner system), the alkali by-pass and the homogeneous technique for raw materials.
(e) use of industrial wastes as cement raw materials.

Fig. No. 7. Program for visit of cement research team of the People's Republic of China to the United States (March 1981).

Investment Corp. Ltd., which is controlled in Beijing (Peking), and Green Island Cement Co., Ltd., currently the principal importer and distributor of cement to the Hong Kong market. ●

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6. "The International Cement Scene: Plant and Production Update, 1981," Sid Levine, Pit & Quarry, January 1981.

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U.S. cement: shortages and $100/ton product

Industry prosperity in the 1980s, but exactly for whom?

Cement report

BY ROY A. GRANCHER
vice president, marketing
Dyckerhoff Inc.,
Atlanta, Ga.

The 1980s have gotten off to a rather slow start in terms of portland cement shipments. Nevertheless, industry observers are "bullish," predicting a level of demand that will cause the decade to rank as one of the best ever in industry history.

The Portland Cement Association's forecast for the period 1980-1985 says "the U.S. portland cement industry appears to be entering the best five-year period in its history." The chairman of one of the largest manufacturers projects "the 1980s will be the golden decade of the cement industry," and the chairman of the industry's largest firm sees cement consumption growing so rapidly that it will far outstrip the industry's ability to produce it. Cement is expected to become a "gray gold," essential in nature to the nation's future.

Recovery becoming short supply, and product prices pushed to $100 a ton levels—this should be ample bullishness to satisfy any cement executive.

Down—but in demand

The U.S. cement industry's unimpressive entrance into the 1980s has been characterized by shipments that are down by almost 11%, or by more than 9 million tons. The year's 76 million total rank it on a par with volumes of the late 1960s. Certain states have been hit hard with 25 to 30% drops (Utah, Iowa, New Hampshire, Michigan); in North Dakota, shipments fell by approximately 40%. With such dismal results recorded, it is no wonder the industry's return on net worth also fell, to 15% vs. the more than 19% achievements of the preceding 2 years.

Meanwhile, the import faucet, particularly the clinker portion, turned down dramatically in 1980. Total tonnage dropped 44% to 5.3 million; clinker imports were down by almost 60%. Major suppliers, such as the United Kingdom, Japan, and Canada, experienced sizable reductions. Million-ton markets of the year before (like the Detroit, Los Angeles, and Seattle customs districts) were down to one-half or one-third their former size.

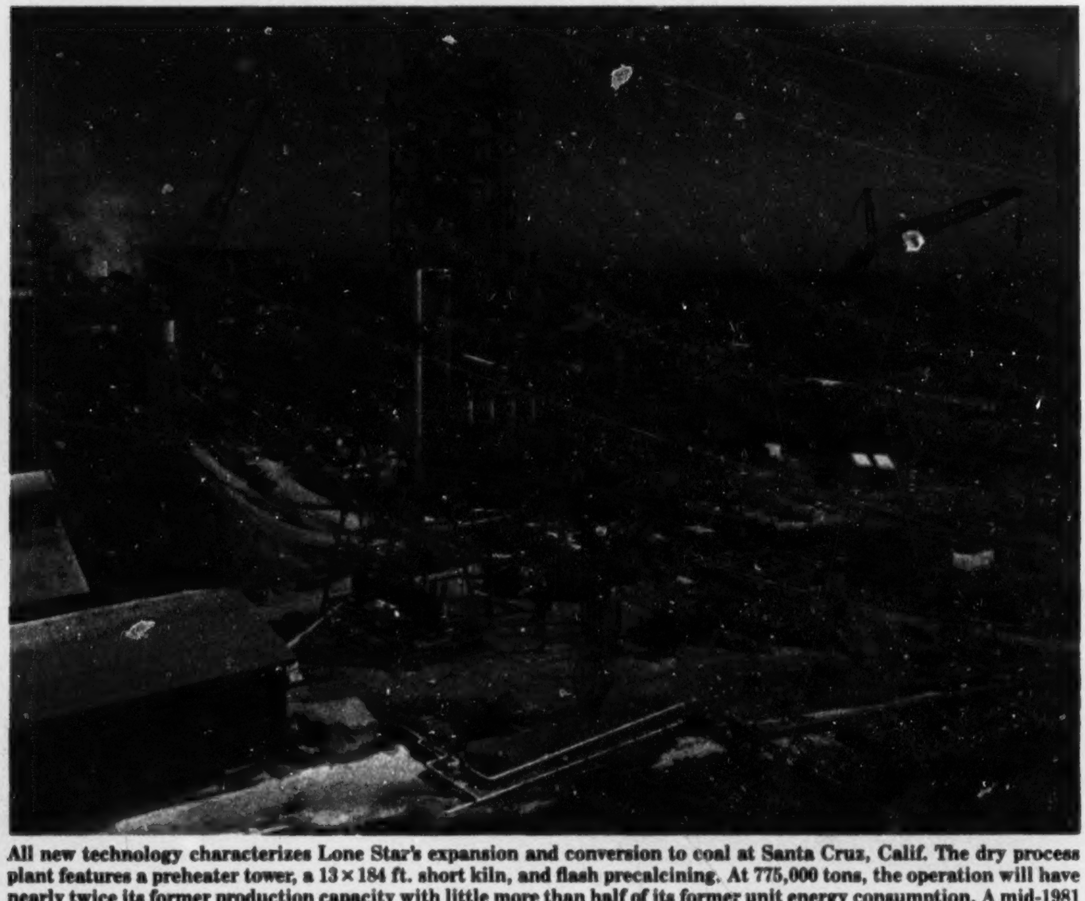
Can this be the calm before the storm of cement demand? Quite probably. Cement shipments are projected to reach 90 million tons by 1985 and to stand at more than 100 million by the end of this decade. During these years that all important and underlying factor for cement growth—increased concrete usage—certainly will be present.

Concrete will capture an expanding market share in the U.S. battle of construction materials. Concrete takes less energy to make and put in place than other materials serving the same building function. Inherent energy-saving characteristics will encourage increased use of concrete for numerous construction purposes. Relative low cost, first cost competitiveness, and energy cost effectiveness are definite advantages.

Less than 10 years ago, escalating energy prices became part of the American experience. As the country continues to react to a high-energy cost economy, the energy efficient material will dominate in construction practice. That material is concrete. One could say the United States is a developing nation in terms of its cement/concrete potential.

In the short term, will the

Representative of major industry effort to modernize and add to capacity is the new $94 million Balcones, Tex. plant of General Portland. Production began at the 925,000 ton coal-fired facility in December 1980. Balcones incorporates the latest in preheater/precalciner technology, the requirement for efficient cement production in the 1980s. Thirteen percent of cost of construction went into systems and equipment to protect the environment. Dyckerhoff Zementwerke A. G., Wiesbaden, served as advisors on the design and start-up operations of the plant.



All new technology characterizes Lone Star's expansion and conversion to coal at Santa Cruz, Calif. The dry process plant features a preheater tower, a 13 × 184 ft. short kiln, and flash precalcining. At 775,000 tons, the operation will have nearly twice its former production capacity with little more than half of its former unit energy consumption. A mid-1981 completion date will add to Lone Star's ability in servicing the San Francisco Bay area and other northern California markets.

"glue" be available to hold the opportunity together? Equally significant, in the longer term, will changed components of concrete necessitate its availability? Both answers can be *no,* and therein can lie the course of the decade.

Clinker constraint

There will be cement shortages during this first half of the 1980s. Capacity data, industry programs, and cost factors support that contention. Construction sector recovery—through revised credit policies and/or personal adjustment to those higher levels—can bring 80-plus to 90 million ton shipment years. Industry finish capacity stands at more than 100 million tons. However, it is in clinker capacity that cement shows its constraint. For 8 years, this capacity has remained at or near 90 million tons. Despite substantial modernization and new additions, the *net clinker tonnage,* after replacement and after industry plant closings, has stayed at a plateau.

This pattern continues to influence the outlook through 1985. Although a total of 12 million tons of additional gross capacity is indicated, clinker capacity, after kiln retirements and other closings that can take place, could increase by only some 6 million tons.

Built-in operating problems are predicted for several plants presently coming onstream. One company's ambitious plans, already announced, may have severely overextended its resources. Certain projects, reported under evaluation or seeking capital, must be rated as only gleams in the corporate eye. The size of the investment required to turn on an efficient cement operation (in interest burden alone) has become prohibitive. A recent plant study showed that a $100 million investment would reduce the operation's gross profit by half. Yet, because of tremendous differences in operating costs among plants, due to age and process, this spending must be made, or else.

Last December, a major brokerage firm lowered its investment rating on cement stocks. The firm had concluded that "long term cement prospects (while still appealing) may not be as ebullient as some forecasters have predicted." Last year's 15% returns surely will not create a rush to addition. A story is told about the East Frisians, a people situated off the coast between Holland and Germany. They are quite rustic in their ways, and considered by some as not being very bright. Yet their native intelligence was amply attested to when a vacationing cement executive, observing that their location would be excellent for his type of business, was told: "Don't think that we are that stupid as to want to build a cement plant."

Price of a gamble

The U.S. cement industry's traditional shift, in response to previous short supply, continues. Volume generally has been added to the south and west of the Mississippi. For a while, Texas has become the state with the largest capacity. (Next year, it will be California.) Yet the biggest cement reaction, and gamble, of the 1980s is dependent on a demand that may not materialize.

The nation's $30 billion MX-missile system offers great promise to the strategically-placed cement producer. But current controversy and debate can wash out this demand. At one point, the MX was the generator of wild consumption figures—35 million tons at an early stage. Then 10 to 17 million tons were projected. Present revised estimates place tonnage at a more believable level of up to 3 million tons. Initially, this expected demand was to be concentrated in two states; then, due to other factors considered adverse, there was a desire to broaden the area. Now, the bottom-line uncertainty is that an entirely different defense plan can win support for MX deployment; the missiles could be based at sea. Several committed cement companies find themselves with a crucial stake in the decision.

Cement's Difference in a Decade—1970 to 1979
(As reported in Bureau of Mines minerals yearbook)

	1970	1979	Data for 1980
Number of active plants	181	164	will show that there are yet fewer plants and fewer kilns in the industry, with more of those remaining being dry process, of larger capacity, and on coal.
Number of clinker plants	169	157	
wet process	106	89	
dry process	63	61	
both	—	7	
Number of kilns	478	377	
Average capacity (000 tons)	495	575	
Fuel: coal, with alternates	67%	85%	

The large capital expenditures for plant modernization and addition have to be pushed through the system and felt in price increases. Advancing prices also must reflect the risk of investment and the tying up of these sizable amounts of capital in cement manufacture. During the 1970s, Bureau of Mines data indicate cement prices per ton went up some 165%. This represents an increase from $18 a ton, upon entering the decade, to nearly $47 a ton at the end. Yet this gain yielded double-digit returns only over the last 4 years.

Can cement reach $100 a ton as predicted? By every logical measure of economic justification, conceivable concept of managerial practice, and by just plain need, they should. The inflationary spiral has created new highs in every facet of daily living—from prime rates to mortgages to filling up the gas tank. No wonder these are the new numbers of our way of life and of our business.

Cement has every right to cost more—quite a bit more. As the industry rides again into an extremely tight supply situation, its product price—like everything else—will escalate.

International traders

The scenario then for the decade's first half will include shortages and higher prices. But reaction will come into play spurred by what went before. This response also will have a direct bearing on the fortunes of cement producers. One factor will be the growth of international trade group activity. Another will be a significant move to blended cements.

Although imports were cut to the bone last year, the impact generally was felt on the purchasing done by cement firms (i.e. clinker). Meanwhile, a basic change was taking place as to who in the future might be doing the importing. The discovery, in the 1970s, of the United States as a cement market was made by major manufacturing export sources; this decade can see the movement of cement as a bulk commodity in international trade.

Developments in California underscore the trend. A major finished cement facility is built by America's leading raw materials trader and Spanish interests. In the port of Stockton, a new 30,000 ton terminal is sponsored by a German group with Japanese bulk carriers supplying production. At Redwood City, controversy rages between consultants over a cement terminal there. One study, conducted for Indonesia's largest cement firm (who want to import in participation with other Asian countries), says the tonnage would ease spot shortages that have plagued the state. The other consultant says these findings do not reflect adequately current industry capacity expansions, and that to rely on demand from politically uncertain projects—such as a canal, a dam, or the MX-missile—is "unwise."

A similar pattern is emerging in Texas while other states may receive the same type of attention. Indeed, it is interesting to note that cement plant modernization and capacity addition have been at their greatest in Texas and California. A confrontation between the domestic capacity and coastal imports can lead to a competitiveness detrimental to the profit need of the industry.

Blended opportunity

Can this be the decade of blended cements? This is a question several companies are answering in the affirmative.

The potential exists, as never before, for the use of differing components in concrete. That initial short supply of cement and those $100 per ton prices can only act as a spur for a move, in the 1980s to blended cement. Mandate, governmentally encouraged use, industry and product recognition, and customer choice will reinforce the speed of acceptance. Cement producers could well end up with their greatest opportunity of this decade: to provide more fully for the needs of their customers in the concrete industries.

How rapidly this move takes place will depend, not only on shortages and high prices, but on how and by whom these materials are provided. What has taken place, and is taking place elsewhere in the world with slag and fly ash, will have a distinct bearing on blended cement development in this country.

Let's look at a basic. Cement's growth is directly related and tied to increased concrete work. Concrete has to win its battle of construction materials against steel, aluminum, glass, asphalt, etc. for all segments of the cement and concrete industries to enjoy the 1980s.

Quality concrete must be the goal in the competitive construc-

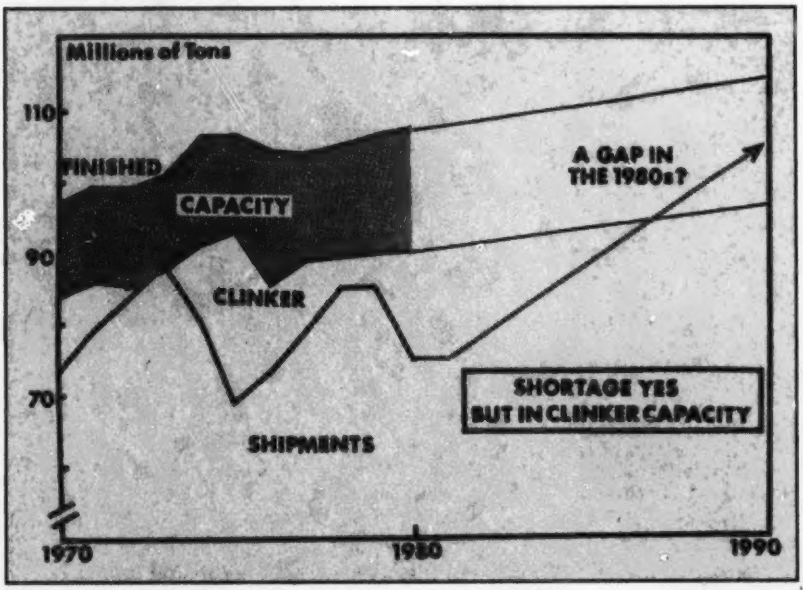


Figure 1. U.S. cement: Capacity vs. shipments, 1970 to 1990.

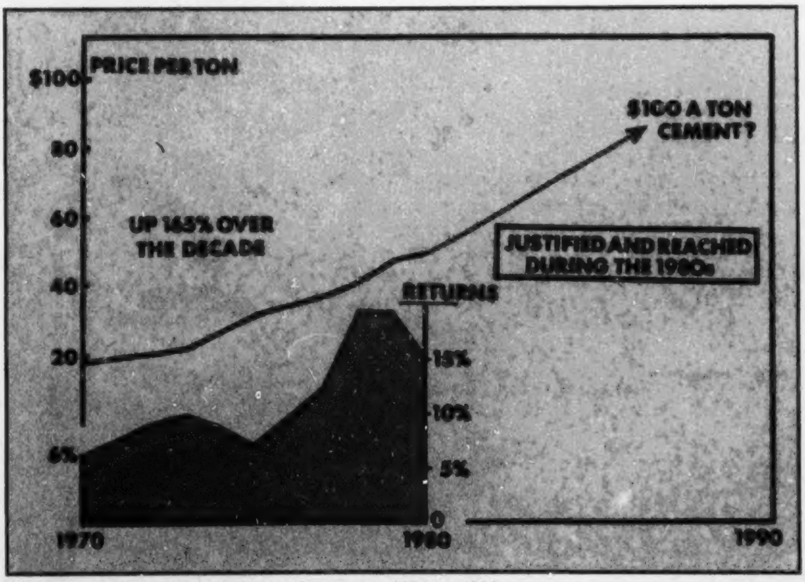
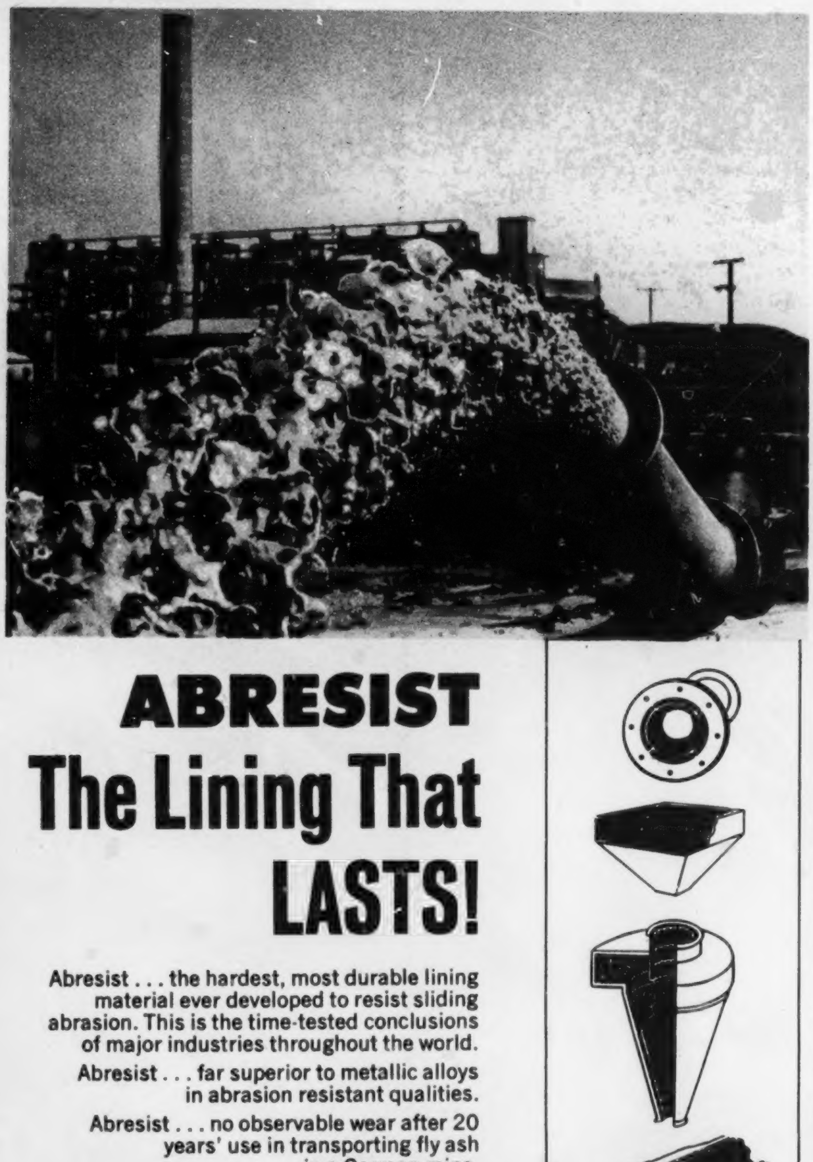


Figure 2. U.S. cement: Price and returns, 1970 to 1990.



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tion materials marketplace. One of the most foolhardy things this industry could do is to look at the short term and achieve a product cost reduction to the detriment of the end product. Realizing the opportunities of the 1980s calls for the best possible concrete. It behooves the cement producer to see to it that quality concrete is the material supplied to the market.

Undoubtedly, points of view will differ, but the fundamentals of quality concern, the logic and experience of intergrinding, the continual testing of mix in plant and market, the controlled production from the nation's relatively few cement plants vs. the varied outputs of thousands of concrete operations—all this certainly should mean the manufactured approach. The very idea of an "Age of Concrete" can be destroyed if the quality factor is neglected.

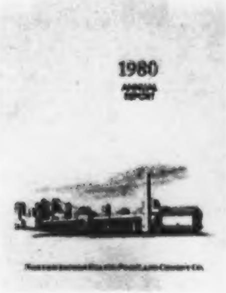
Which business for the decade?

Cement industry prosperity in the 1980s depends on how successfully the industry meets and participates in the different demand patterns presented by each half of the decade. The "right" moves for the first half may be the "wrong" ones for the second. The requirement is an overlap of short term strategy with long range objectives and a clear definition of exactly what business a firm feels it is in.

If all are part of the cement/concrete industries, and if the cement producer functions as the raw material supplier to those who market that flexible, inexpensive, quality building product, then the course of action becomes obvious. Extension of traditional lines includes a place for blended cements. There are those who have termed cements of slag and fly ash the "Hamburger Helpers" of the '80s; they may prove to be the industry's "Steak Tartare."

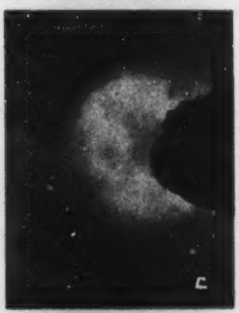
The industry's bullishness is not unfounded. However, it will call for a blend of factors that include enlightened attitudes to the new, determination to make it come about, and preservation of the "Golden Goose" of quality concrete upon which so much of tomorrow depends. ●

Cement report



Annual financial reports round-up

Cement and aggregates revenues reflect construction activities



BY SID LEVINE

Mixed economic results in 1980 and guarded optimism about 1981's outlook for the cement and related construction minerals industries were recorded in 1980 annual reports. High interest rates, high inflation, and increased tax burdens were blamed for current conditions in the construction minerals markets.

Minerals, mineral products designated "construction minerals," and average percentages of their use in construction are: portland cement, 100%; masonry cement, 100%; calcined gypsum, 100%; expanded clay, shale, and slate, 100%; iron blast furnace and steel slag, 98%; sand and gravel, 97%; pumice, 87%; crushed stone, 75%; exfoliated vermiculite, 65%; dimension stone, 60%; expanded perlite, 35%; crude gypsum, 30%; fly ash, 13%; and lime, 6%.

Five-year sales figures for construction minerals producers and a brief outline of their lines of business are given in this survey of 1980 annual reports.* Industry production data, corporate realignments and new establishments, and a tabulation of North American cement company production for 1980 also are provided in this annual Pit & Quarry financial report.

First quarter reports indicate a better than usual level of construction minerals sales for the first three months of 1981. This is attributed to construction activity in the abnormally mild winter

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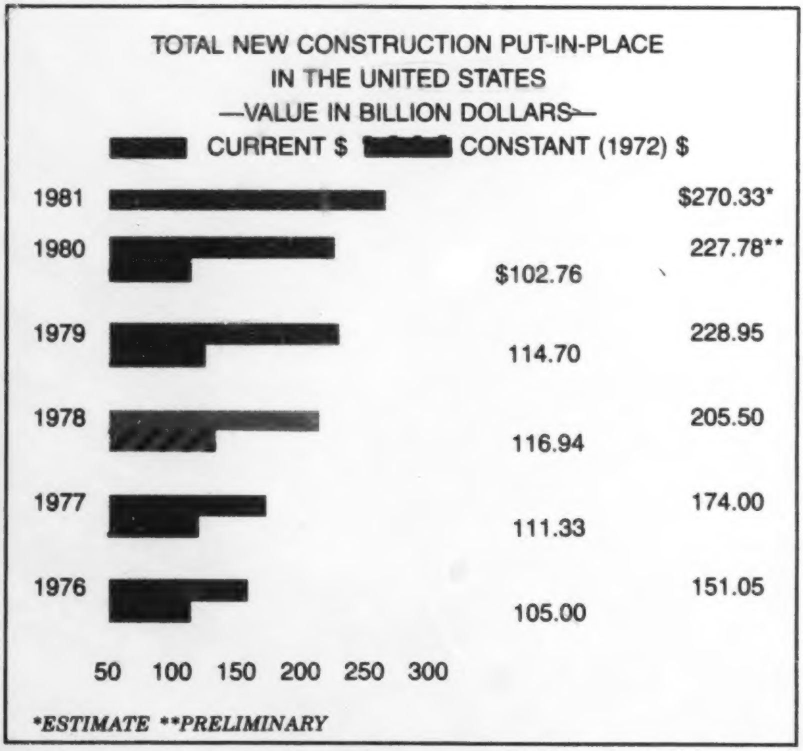
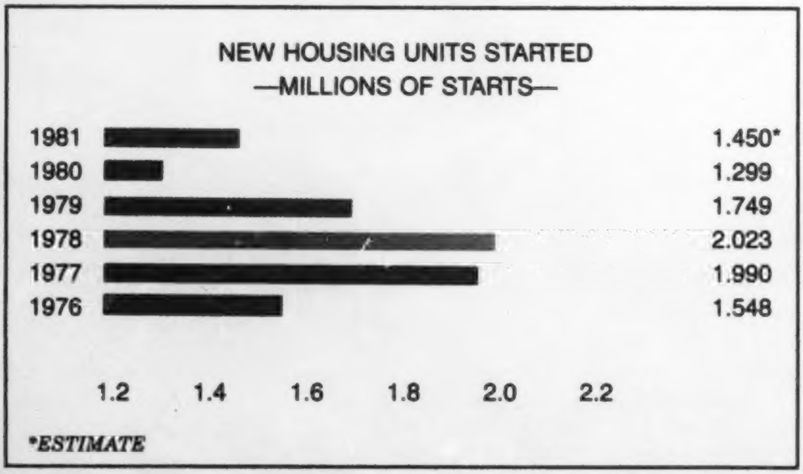
For year ended December 31, except as noted.



TOTAL NEW CONSTRUCTION PUT-IN-PLACE IN THE UNITED STATES —VALUE IN BILLION DOLLARS—

*ESTIMATE **PRELIMINARY



NEW HOUSING UNITS STARTED —MILLIONS OF STARTS—

*ESTIMATE

weather. Traditionally, these early, interim financial reports show low sales for cement, concrete, and construction aggregates because of normal weather-related sluggishness in construction.

The physical volume of new construction, put-in-place in the United States, declined in 1980 about 10% from 1979 but is expected to recover in 1981 by about 8%. The current dollar value of new construction remained virtually constant from 1979 to 1980 despite a 10% increase in prices. Based on constant (1972) dollars, the 1980 change in new construction value was a 10% drop from 1979. Although the value of new construction is expected to rise 18% in 1981 to about $270 billion, more than half the increase will simply reflect higher input costs.

Construction contracting in 1981 is expected to total $164.5 billion, about 12% above the actual amount spent in 1980, according to a recent update of the "1981 Dodge/Sweet's Construction Outlook," issued last October by McGraw-Hill Information Systems Co. Residential building for this year is expected to reach $76 billion, a 20% gain over 1980, with housing starts estimated to reach 1.45 million units compared with 1.3 million in 1980.

Cement

Portland cement shipments from plants in the United States dropped in 1980 to an estimated 76.5 million short tons, about 8.3% less than the 83.4 million tons shipped in 1979. The 1981

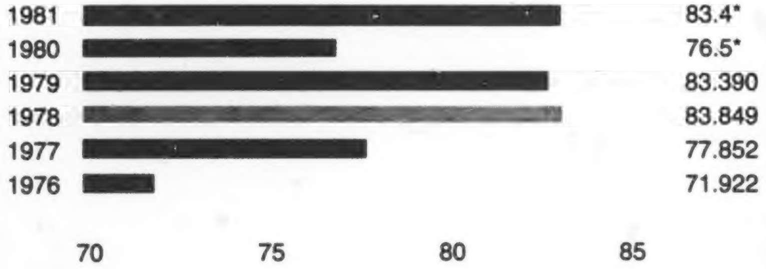
forecast of a 9% increase would bring the quantity shipped to around 83.4 million tons. Shipments from mills (plants) include: cement ground from clinker manufactured in kilns in the United States and Puerto Rico: cement ground from imported clinker; cement imported and distributed by domestic producers only.

In 1980, cement clinker was made domestically by 55 companies and one state agency operating 168 plants in 39 states and by two companies operating two plants in Puerto Rico. Estimated total value for 1980 portland cement shipments is $4.1 billion compared with $3.86 billion in 1979. Cement and clinker imports in 1980 were estimated at 5.7 million short tons compared with 9.4 million tons in 1979.

Portland cement shipments in 1980 by type of customer were: 67% to the ready mixed concrete industry; 14% to producers of concrete products, such as concrete block, concrete pipe, and precast and prestressed concrete; about 8% to building materials dealers; 9% to highway and other contractors; and the remaining 2% to various buyers including government agencies.

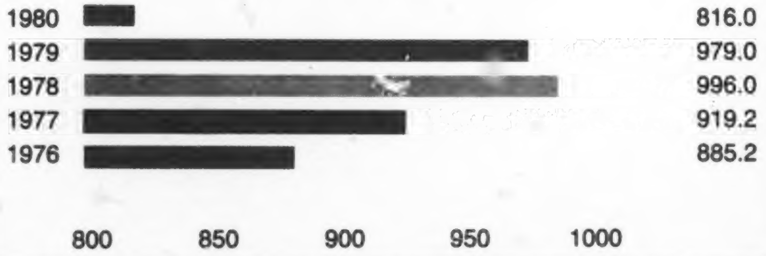
Studies indicate that about 30% of cement consumption usually goes into residential construction, 22% into private industrial and commercial building, 7% into public building, 18% into public works, 18% into transportation (highways, railroads, mass transit), and 5% into other construction. Shipments of masonry cement in 1979 totaled 3.8 million

PORTLAND CEMENT-SHIPMENTS FROM PLANTS IN THE U.S. —MILLION SHORT TONS—

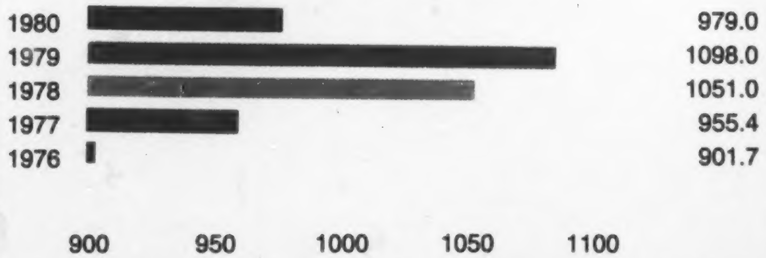


*ESTIMATE

SAND & GRAVEL PRODUCTION IN THE U.S. —MILLION SHORT TONS—



CRUSHED STONE PRODUCTION IN THE U.S. —MILLION SHORT TONS—



short tons and were valued at $205 million.

The cement industry's three major problem areas continue to be capacity and capacity utilization, energy conservation and conversion, and air pollution control regulations. All these areas will involve sizable capital expenditures, and it may be difficult for many producers to generate the needed funds. Capacity utilization is important to producer profits and to the ability to raise capital.

Another factor that influences the amount of capacity available is the huge cost of building a new plant or making a major addition such as a new kiln. A completely new plant, using the energy-conserving preheater dry-process technology and having the required air pollution control equipment, can cost $125 million or more for a facility with an annual capacity of 1 million tons. In addition, regulatory approvals (federal, state, and local) can take as long as 2 years to secure. About 2 more years are needed to build the plant, and maybe another year to get it into full operation.

The cement industry is one of the most energy-intensive industries. Energy costs range from about 30% of total production costs for an efficient plant to more than 50% for the usually older wet-process operation. In the next 15 to 20 years, huge capital expenditures will be required to purchase the dry-process equipment that uses preheater or other energy-saving technology. Major energy-conservation gains can be made only by closing old plants and building new ones or by replacing kilns which are by far the largest and most costly pieces of cement-making equipment. The industry presently has a shorter-range program to convert most production facilities to coal-fired or coal-backup systems by the early 1980s.

The industry's capital requirements also are increased by the need for existing plants to meet air pollution regulations. These regulations were a factor in some kiln- and plant-closing decisions in the 1970s. Although the bulk of these expenditures already has been made, additional funds will be required in the next few years. The total cost of meeting air pollution standards for a cement plant is sizable. About 20 to 25% of the cost of building a new plant is for emission control equipment; when the equipment is in place, it adds to operating expenses.

The volume of cement shipments from U.S. mills is expected to rise at a compound average annual 3.4% rate between 1980 and 1985 bringing total shipments to almost 90 million tons by 1985. High demand in the mid-1980s, depending on geographic patterns, could result in shortages. This again would draw in more imports—if cement is available in the world market—and spur the need for greater industry capacity.

Concrete

Ready mixed concrete: The demand and output patterns of the ready mixed concrete industry (SIC 3273) are very similar to those of the cement industry. On a year-to-year basis, ready-mix producers purchase about 66 to 67% of total cement shipments. The value of industry shipments in 1981 should be about $10.7 billion. This is a 16% increase from the $9.2 billion shipped in 1980 and represents a 6% volume rise.

This industry is characterized by a large number of small firms that serve local markets. In 1977, there were about 4,300 companies with 5,400 establishments. Most plants were very small; only 1,400 had 20 or more employees. Most (about two-thirds) were dry-batch plants; almost a quarter were central-mix operations; and about 10% were portable mixing facilities.

A 3.4% compound average annual rise in volume of shipments for the ready mixed concrete industry is forecast for the 1980-85 period. This not only anticipates higher levels of construction activity in 1985 compared with the recession-plagued 1980 market, but also a small increase in market share for poured-in-place concrete at the expense of other types of non-concrete construction.

Concrete block and brick: In 1980, the value of shipments declined 2% to about $1.5 billion on a volume drop-off of 13%. An 8% gain in volume is expected in 1981 for concrete block and brick production (SIC 3271). The value of shipments should reach almost $1.8 billion, an 18% rise from 1980. Contributing to this increase are a gain in housing starts and higher levels of office building activity.

This industry, like the ready-mix industry, has very localized markets with shipments within 100 miles of the plant and usually much closer. In 1977, about 1,275 plants were operated by more than 1,160 companies. Only about 350 of these plants had 20 or more employees. The trend in this industry is toward fewer, and larger, more modern facilities. More than 300 fewer plants were in operation in 1977 than in 1967.

Based on the favorable outlook for new housing and nonresidential buildings in 1985, the volume

(continued on page 144)

"Outlook

In 1981, the American economy will sail on largely uncharted seas, with high levels of interest rates and of inflation offering no historical precedent for those analysts who would project the course of economic activity. Further clouding the forecast are the changing economic and fiscal philosophies being brought into prominence by the transition in Washington.

Such indicators as interest rates, business capital spending, and unemployment trends point toward a potential recurrence of recession. An early-1981 peak in interest rates followed by a moderate decline in those rates would benefit conditions in many of our end markets. Any federal initiatives to stimulate capital formation would further increase the likelihood of improvement in those end markets and would favor a general resumption of economic growth."

This excerpt from the Koppers Co. 1980 annual report is representative of similar expressions of uncertainty concerning 1981's economic environment that appeared in most of the annual reports listed in this P&Q review.

(continued from page 136)

of concrete block and brick shipments should rise at a 3% compound average annual rate between 1980 and 1985.

Other concrete products: The concrete products, N.E.C. industry (SIC 3272) consists of firms that produce a variety of concrete products such as pipe, precast and prestressed concrete products, and bagged dry mixes. The major market for these products is nonresidential construction except for dry mixes which mainly depend on residential additions, alterations, and repairs.

In 1980, the value of shipments increased 3% to $4.05 billion based on a 7% reduction in volume. The value of industry shipments in 1981 should reach $4.65 billion, up 15% from 1980. The volume increase will be an estimated 5%.

The number of companies and establishments in this industry has been rising; in 1977, about 3,500 firms operated more than 3,900 plants. In 1967, there were less than 3,100 companies and about 3,400 plants. Less than 900 of the plants in 1977 had 20 or more employees.

Long-term prospects for this industry are favorable. Contractors are turning to factory-built components and building systems to improve quality control, reduce seasonality, speed up the on-site erection process, and, in some cases, to save money. The bridge replacement program expected in the 1980s should stimulate the demand for prestressed concrete units. Between 1980 and 1985, the volume of shipments by the concrete products N.E.C. industry should grow at a compound average annual rate of 3.7%, the fastest rate for any of the cement and concrete product industries.

North American Cement Company Capacities*
(as of December 31, 1980)
In million short tons

Clinker	Cement	United States Company
8.210	8.958	Lone Star Industries, Inc.
5.527	6.055	Ideal Basic Industries
5.216	5.987	General Portland Inc.
4.787	5.265	Gifford-Hill Co.
4.781	5.043	Lehigh Portland Cement Co.
4.706	4.776	Martin Marietta Corp.
3.859	3.745	Kaiser Cement and Gypsum Corp.
3.222	3.480	Dundee Cement Co.
3.178	3.540	National Gypsum Co.
2.862	3.553	Medusa Corp.
2.846	3.550	California Portland Cement Co.
2.823	2.960	Southwestern Cement
2.614	3.526	Marquette
2.361	2.630	Missouri Portland
2.085	2.765	Texas Industries, Inc.
2.073	2.530	Louisville Cement Co.
1.790	2.094	Penn-Dixie Industries Inc.
1.663	1.710	Moore McCormack Cement Inc.
1.525	1.750	Alpha Portland Industries
1.492	1.792	Centex Corp.
1.488	1.550	Atlantic Cement
1.248	1.306	Ash Grove Cement Co.
1.148	1.150	River Cement Co.
1.128	1.605	Oregon Portland Cement Co.
1.098	[illegible]	The Monarch Cement Co.
.964	1.002	Coplay Cement
.957	1.220	Columbia Cement Co.
.906	1.100	South Dakota Cement Plant
.864	1.150	Northwestern States Portland Cement Co.
.854	0.800	National Cement
.848	0.950	Arkansas Cement
.840	1.240	The Flintkote Co.
.790	0.855	Giant Portland and Masonry Cement Co.
.765	0.790	The Whitehall Cement Manufacturing Co.
.750	0.750	Citadel Cement
.700	0.757	Hercules Cement Co.
.696	1.125	Monolith Portland Cement Co.
.581	0.625	Keystone Portland Cement Co.
.517	0.625	Rinker Cement
.408	0.690	Alamo Cement Co.
.338	0.355	Capitol Aggregates Cement
.330	0.900	Gulf Coast Cement
.269	0.300	SME Cement Inc.
.228	0.300	Cyprus Hawaiian Cement
		Canada Company
5.169	6.972	Canada Cement Lafarge
3.484	4.326	St. Lawrence Cement
2.234	3.022	Inland Cement Ind. Ltd.
1.756	1.753	St. Marys Cement Ltd.
1.390	.750	Lake Ontario Cement
.924	.744	Miron Inc.
.340	.529	Ciment Quebec Inc.
.143	.276	North Star Cement Ltd.
.106	.110	Federal White Cement

Source: *Market and Economic Research Dept., Portland Cement Association, "U.S. and Canadian Portland Cement Industry: Plant Information Summary," Dec. 31, 1980*

**Includes gray and white cement plants. Does not include grinding-only facilities.*

Aggregates

Sand and gravel: An estimated total of 816 million short tons of sand and gravel, valued at about $2.3 billion, was reported sold or used in the United States in 1980. Construction sand and gravel constituted 97% of the uses, and industrial applications accounted for the other 3%. Construction allocations were 43% for aggregate for portland cement concrete; 15% for asphaltic concrete aggregate; 24% for road bases and coverings; 16% for fill; and 2% for railroad ballast, snow and ice control, etc. Demand for sand and gravel is forecast to increase at an annual rate of 1.1% for the next 5 years.

Crushed stone: Output of crushed stone in 1980 is estimated to be 979 million tons, valued at $3.2 billion. About 75% of production was used for construction including dense-graded road-base stone, concrete aggregate, road stone, cement, bituminous aggregate, etc. Demand for crushed stone is expected to grow at an annual rate of 2%.

(continued on page 148)

Corporate Changes in the U.S. Cement Industry: 1979-1981

Formerly	Acquired	Now
Amcord, Inc.	1979 by	Gifford-Hill & Co., Inc.
Hercules Cement Co. (Amcord/Gifford-Hill)	1981 by	U.S. Cement Co. (subsid. IFI International, Italy)
Flintkote Co., The	1980 by	Genstar Limited, (Canada)
Kosmodale, Ky. plant (Flintkote/Genstar)	1980 by	Moore McCormack Resources, Inc.
Glens Falls, N.Y. plant (Flintkote/Genstar)	1980 by	Moore McCormack Resources, Inc.
OKC Corp.	—	Liquidation plans announced in 1980
Pryor, Okla. plant (OKC Corp.)	1980 by	Lone Star Industries, Inc.
New Orleans, La. plant (OKC Corp.)	1980 by	Lone Star Industries, Inc.
Penn-Dixie Industries, Inc.	—	In 1980, filed for protection under Chapt. 11 of the Federal Bankruptcy Act
West Des Moines, Iowa plant (Penn-Dixie)	1981 by	Martin Marietta Corp.
Kingsport, Tenn. plant (Penn-Dixie)	1981 by	Dixie Cement Co. (subsid. Moore McCormack Resources)
Richard City, Tenn. plant (Penn-Dixie)	1981 by	Dixie Cement Co. (subsid. Moore McCormack Resources)
Nazareth, Pa. plant (Penn-Dixie)	1980 by	Coplay Cement Co. (subsid. Societe des Ciments Francais, France)
Petoskey, Mich. plant (Penn-Dixie)	1981 by	Dundee Cement Co.
West Winfield, Pa. plant (Penn-Dixie)	1981 by	Penn-West Cement Co., Inc.
Portland Cement Co. of Utah	1979 by	Lone Star Industries, Inc.
Florida Mining & Materials Corp.	1979 by	Moore McCormack Resources Inc.
San Antonio Portland Cement Co.	1979 by	Presa S.P.A. Cementeria di Robilante, Italy and Cementwerke Vigier AG, Switzerland.
River Cement Corp. (subsid. Missouri Pacific Corp.)	1979 by	IFI International SA, Italy
Universal Atlas Cement (div. United States Steel)	1980 by	Heidelberger Zement AG, W. Germany
Whitehall Cement Manufacturing Co.	1981 by	General Portland Inc.
McDonough Co.	1981 by	Hanson Industries, Inc. (subsid. Hanson Trust Ltd., London)
National Gypsum Co., Cement Div.	—	National Gypsum Co. (ended talks with General Dynamics Corp. for acquisition of Cement Div.)
Dixon, Ill. plant of Medusa Cement Corp.	1980 by	Lone Star Industries, Inc.
New Orleans, La. plant of Lone S[illegible]ndustries (divestment)	1980 by	Citadel Cement Corp. (subsid. Canada Cement Lafarge Ltd., Canada)

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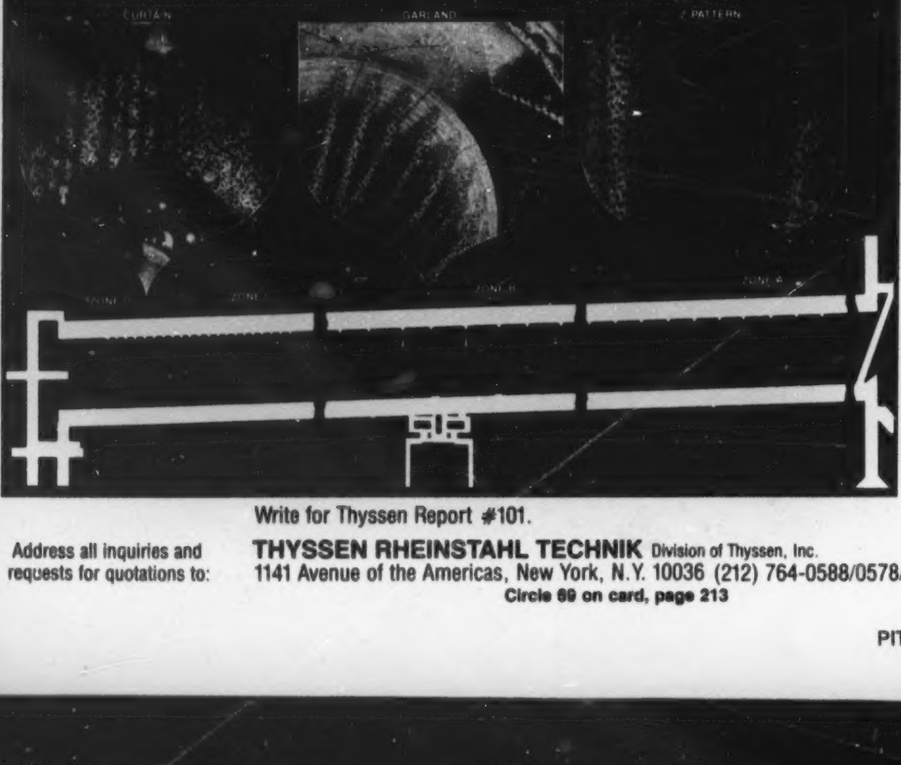

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Kaiser Cement Market Summary

(Amounts in Thousands, Except Percents)	U.S.	Total Kaiser Markets	Pacific Southwest	Texas	North-west	Rocky Mountains	Hawaii
Demographic Data							
1980 Population	226,505	51,453	27,186	14,228	7,163	1,911	965
Net Migration(1)	—	408	204	111	75	14	4
Population Growth(1)	.9%	1.9%	1.8%	2.2%	1.9%	1.4%	2.1%
1980 Households	79,361	18,234	10,018	4,690	2,565	680	281
Household Growth(1)	2.0%	2.9%	3.0%	2.9%	2.9%	2.7%	3.0%
Construction Data							
Housing Starts(1)	1,715	502	259	148	69	14	12
Contract Awards(1) (2)	85,380	22,310	10,989	6,093	3,641	988	599
Cement Data (tons)							
1980 Shipments	76,944	23,034	10,223	9,004	2,357	1,075	375
Share of U.S. market		29.9%	13.3%	11.7%	3.1%	1.4%	.5%
Average Shipments(1)	80,814	21,053	10,159	7,300	2,201	976	417
Share of U.S. market		26.1%	12.6%	9.0%	2.7%	1.2%	.5%

(1) Annual average from 1970 to 1980. (2) Millions of 1972 constant dollars.

Kaiser Cement Corp.'s plants serve five primary geographic areas: the Pacific Southwest (California, Arizona, and Nevada), Texas, the Northwest (Washington, Oregon, and Alaska), the Rocky Mountains (Montana, Wyoming, and North Dakota) and Hawaii. The relationship between national demographic and construction data and the company's share of the cement market is shown in this tabulation from Kaiser Cement's 1980 annual report.

Dimension stone: Production of dimension stone in 1980 was estimated at 1.21 million tons and valued at $123 million. Demand is estimated to increase at an annual rate of 1%.

Slag: About 27 million tons of iron and steel slags were sold or used in the United States in 1980 with a total value of $100 million FOB. Construction uses accounted for nearly all the output, including incorporation of the slag into road bases, fill, asphaltic concrete aggregate, and portland cement concrete aggregate.

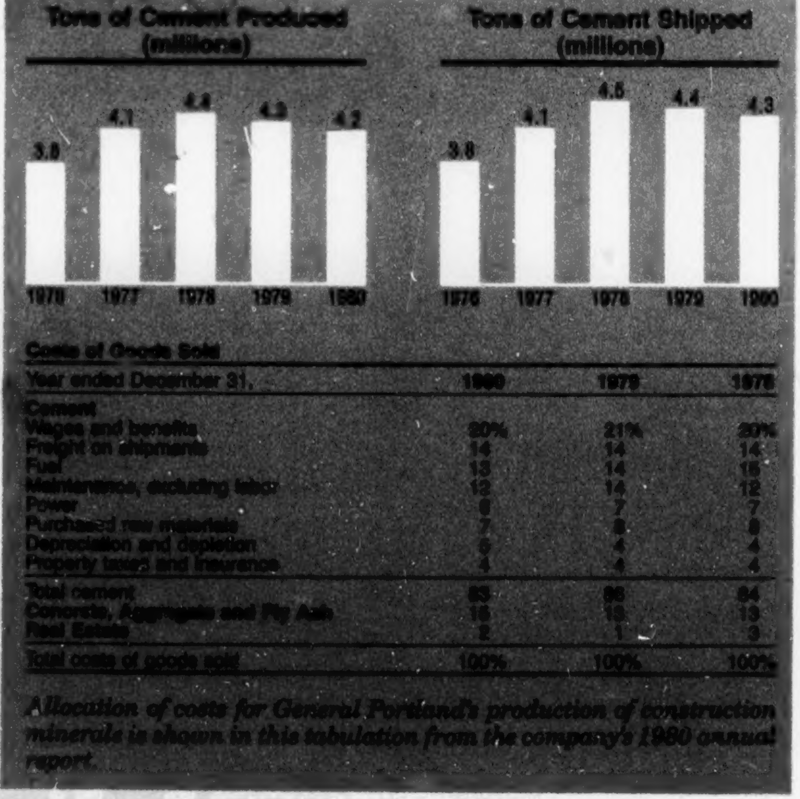
Pumice and volcanic cinder: Mine production of pumice and volcanic cinder in the United States amounted to an estimated 4.652 million tons in 1980. Total estimated value of the amount sold or used was $20 million. The major uses of pumice and volcanic cinder combined were for road construction (45%) and concrete aggregates and admixtures (40%). Demand for the next 5 years is expected to increase at an annual rate of 4%.

Perlite: Processed perlite produced in 1980 was estimated at 635,000 short tons and valued at $16.6 million. Crude ore came from 13 mines operated by 11 companies in 7 western states. The ore was expanded by 45 companies at 79 plants in 33 states. Demand for perlite is expected to increase at an annual rate of about 2.8%. In 1980, 45% of production was used for insulation board, plaster, and concrete aggregate.

Vermiculite: Mine production of vermiculite sold or used in the United States in 1980 was estimated at 339,000 tons and valued at $24.3 million. Most of the crude vermiculite was shipped to 47 exfoliating plants in 30 states. The major uses for exfoliated vermiculite were: insulation, 31%; lightweight concrete aggregate, 23%; plaster and cement aggregate, 13%; and agriculture, 31%. Demand for vermiculite is expected to increase at an annual rate of about 3%.

Gypsum

Output of crude gypsum mined in the United States in 1980 was estimated at 12.1 million tons and



Costs of Goods Sold

Year ended December 31,	1980	1979	1978
Cement			
Wages and benefits	20%	21%	20%
Freight on shipments	14	14	14
Fuel	13	14	15
Maintenance, excluding labor	12	14	12
Power	6	7	7
Purchased raw materials	7	8	8
Depreciation and depletion	6	4	4
Property taxes and insurance	4	4	4
Total cement	83	86	84
Concrete, Aggregate and Fly Ash	15	13	13
Real Estate	2	1	3
Total costs of goods sold	100%	100%	100%

Allocation of costs for General Portland's production of construction minerals is shown in this tabulation from the company's 1980 annual report.

valued at $93 million. Imports, including anhydrite, amounted to 7.4 million tons. Apparent consumption (crude gypsum + by-product gypsum + imports − exports + industry stock adjustment) amounted to 20.2 million tons. Of the total supply of crude gypsum (including 800,000 tons of by-product gypsum), 13.6 million tons was calcined for gypsum products, and 5 million tons was used mainly as a cement retarder or as agricultural land plaster. The calcined gypsum was sold as prefabricated products or as plaster. Sales of gypsum for cement use was 3.3 million tons. Demand for gypsum is expected to increase at an annual rate of about 2.5%.

Lime

Construction uses accounted for 9% of the estimated 18.1 million tons of lime produced in 1980. The construction applications include soil stabilization, mason's lime, and finishing lime. Demand for lime is expected to increase at an annual rate of about 2.5%.

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Fly ash

This by-product of electrical energy generation in coal-fired power stations can be considered the sixth most abundant solid mineral resource in the United States. About 13% of an estimated 50 million short tons of fly ash collected in 1979 was used in construction applications.

Fly ash use as a construction mineral includes incorporation in Type 1-P cement; mix with raw material for producing cement clinker; lightweight aggregate; stabilization and roads; fill for roads, reclamation, and ecology dikes; and filler in asphalt mix.

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"Portland cement: production and project survey," Sid Levine—Pit and Quarry, January 1981.

Financial reports roundup

ALPHA PORTLAND INDUSTRIES, INC.

Cement & aggregates—net sales

	In millions	% of total sales
1980	$ 90.395	34.4%
1979	101.596	42
1978	88.071	39.3
1977	75.811	37.4
1976	71.498	31

Lines of business: Production and sale of portland cement and construction aggregates from four cement and two aggregate plants; heavy construction, including tunnel construction, pile driving, and subsurface construction; and mechanical contracting.

AMERICAN AGGREGATES CORP.

(year ended March 31)

Aggregate business—net sales

	In millions	% of total sales
1981	$48.221	84.2%
1980	58.429	88.7
1979	52.388	89.7
1978	41.013	89.9
1977	31.217	85

Lines of business: The corporation is engaged primarily in the business of mining, processing, and selling sand, gravel, and limestone and slag aggregates.

Consolidated subsidiaries are engaged in hydraulic dredging of inland waterways and in the manufacturing and sale of precast concrete products and prestressed concrete building units.

ARMCO INC.

Mineral resources—net sales

	In millions	% of total sales
1980	$140.2	2.5%
1979	78.3	1.6
1978	83.4	1.9
1977	62.8	1.8
1976	97.5	3.1

Lines of business: Oil field equipment and production; fabricated metal products; carbon steel products; specialty steel products; mineral resources (coal, iron ore, limestone, lime); industrial products and services; and financial services. Limestone mining and lime production are conducted at the Black River Lime Co. quarry and plant at Carntown, Ky.

ARUNDEL CORP., THE

Aggregates—net sales

	In millions	% of total sales
1980	$25.795	49.6%
1979	23.332	49.6
1978	18.877	42.3

Concrete—net sales

	In millions	% of total sales
1980	$26.010	50 %
1979	20.790	44.2
1978	17.973	40.3

Lines of business: Construction materials production (sand, gravel, stone, blast furnace slag aggregates, ready mixed concrete, prestressed/precast concrete, brick); and real estate.

ASARCO INC.

Lines of business: Production of nonferrous metals, including silver, copper, lead, zinc; production of nonmetallic minerals, including asbestos, coal, ilmenite, and limestone; smelting of nonferrous metal ores; scrap metal recycling; specialty chemical production; solar energy systems; and asbestos-cement pipe manufacture.

American Limestone Co., a division of Asarco, markets in seven states, mostly in the Southeast, the products from five stone quarries, two sand and gravel plants, one transit-mix concrete plant, and three limestone plants that process the by-product limestone from Asarco's Tennessee zinc mines.

BETHLEHEM STEEL CORP.

Net limestone production

	Million short tons	% consumed by Bethlehem's operations
1980	3.7	98%
1979	4.8	98
1978	4.6	97
1977	4.4	98
1976	4.6	88

Lines of business: Bethlehem is an integrated steel producer engaged primarily in the manufacture and sale of steel and steel products. The company also engages in marine construction, including the building and repairing of ships and the building of mobile offshore oil drilling platforms and in the manufacture of plastic products.

Incidental to its steel business, Bethlehem is engaged in the mining of ore and coal and the quarrying of limestone chiefly for its own use; the transportation of ore, coal, and limestone on the Great Lakes, and of bulk commodities between foreign ports and the United States, and the operation of short-line railroads in the vicinities of its plants.

Mineral products include iron ore, manganese ore, metallurgical and industrial bituminous coal, anthracite, lime, metallurgical, commercial, and agricultural limestone, slag, mineral wool, asphaltic concrete, copper concentrates, bentonite, and rutile.

BLOUNT, INC.

(fiscal year ended last day of February)

	In millions	% of total sales
1981	$486.834	74.8%
1980	361.658	65.3
1979	318.708	74.8
1978	295.225	78.1
1977	267.249	80.3

Lines of business: Construction, agribusiness, and specialty steels. The aggregate division of the construction segment mines and processes sand, gravel, and limestone in Michigan.

CALIFORNIA PORTLAND CEMENT CO.

(year ended April 30)

Cement Division—revenues

	In millions	% of total revenues
1980	$172.6	80.8%
1979	152.4	76.6
1978	122.8	82.5
1977	92	82
1976	70.6	74.7

Concrete & Stone Products Division—revenues

	In millions	% of total revenues
1980	$37.9	17.7%
1979	38.8	19.5
1978	22.8	15.3
1977	19.4	17.3
1976	21.6	22.8

Lines of business: Portland cement, coal, prestressed/precast concrete products, ready mixed concrete, aggregates, limestone, oil, and natural gas.

CANADA CEMENT LAFARGE LTD.

Sales

	In millions
1980	$711.1
1979	618.3
1978	535.3
1977	439.7
1976	384.8

Lines of business: Cement, aggregates, ready mixed concrete, precast/prestressed concrete, concrete block, concrete pipe, asphalt, and construction.

CECO CORP., THE

Concrete forming services & products—net sales

	In millions	% of total sales
1980	$122.381	28.1%
1979	103.5	24.7
1978	82.2	24.1
1977	63.2	23.7
1976	62.9	25.3
1975	71.7	27.7

Lines of business: Concrete forming services and products (installation of forming work for concrete buildings; manufacture of concrete pipe, block, and prestressed concrete sections); steel mill products; fabricated building products; and door products.

CONROCK CO.

Total revenues

	In millions
1980	$131.565
1979	139.358
1978	111.684
1977	97.730
1976	81.745

Lines of business: The company is engaged in multi-unit aggregate and ready mixed concrete operations in southern California. Products include rock, sand, and gravel for concrete aggregates; rock, sand, and gravel for special commercial uses; ready mixed concrete; sand for plastering, gunite, and masonry; crushed rock for streets, highways, and asphaltic concrete; road construction base; rock dust for streets, highways, and asphaltic concrete; cobbles for river work and flood

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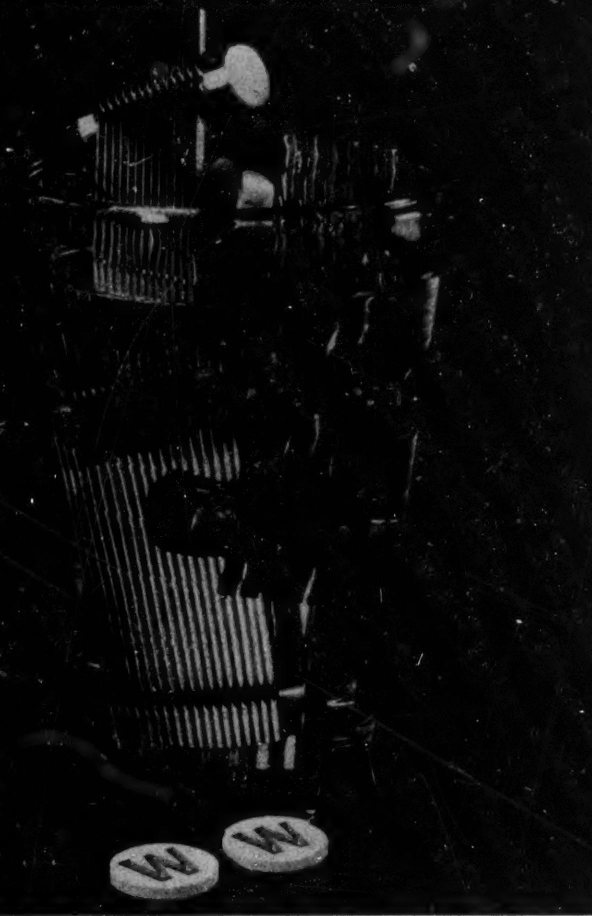

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control work; ballast for railroads; asphaltic slurry seal coat mixes; and nursery sand for golf courses and landscaping.

CONTINENTAL MATERIALS CORP.

Minerals and mineral products—revenues

	In millions	% of total revenues
1980	$14.353	34.2%
1979	13.086	40.4
1978	10.588	39.2
1977	7.940	34.2
1976	5.179	29.7

Lines of business: Minerals and mineral products segment—production of sand, gravel, limestone, ready mixed concrete, copper ore. Building components and supply segments—manufacture of heating, cooling, and ventilation equipment and of hollow metal doors.

DENISON MINES LTD.

(corporate headquarters:
Toronto, Ont., Canada)

Cement & cement products*—sales

	In millions	% of total sales
1980	$89.35	24.5%
1979	88.32	28.4
1978	78.36	29
1977	64.64	32.5
1976	54.85	34.3

Minerals (uranium, limestone products, oil & gas)—sales

	In millions	% of total sales
1980	$275.81	75.5%
1979	222.19	71.6
1978	191.53	71
1977	134.42	61.5

Lines of business: Production of uranium, oil, gas, potash, coil, cement, limestone, lime, kaolin, silica sand, feldspar, etc.

**This is the company's Lake Ontario Cement Ltd. division. See separate listing under Lake Ontario Cement.*

DRAVO CORP.

Natural resources segment—revenues

	In millions	% of total sales
1980	$233.6	21 %
1979	214.5	21.6
1978	164.1	17.1
1977	130.6	13.8
1976	107.9	13.3
1975	92.7	11.3

Lines of business: Dravo operates within five segments—engineering construction, manufacturing, natural resources, equipment, and transportation.

The Natural Resources Group's products include sand, gravel, lime, limestone, ready mixed concrete, concrete block, coal, and power plant scrubber sludge stabilizer. Southern Industries Corp. division produces shell, sand, gravel, slag, stone, ready mixed concrete, asphaltic concrete, concrete block, lime, poultry feed supplement, and filler material for industrial rubber products.

ENGELHARD MINERALS & CHEMICAL CORP.

Nonmetallic minerals—revenues

	In millions	% of total sales
1980	$195.2	0.7%
1979	177	1
1978	155.4	1.5
1977	130.9	1.8
1976	107.4	1.6
1975	80.9	1.4

Lines of business: Marketing of ferrous and nonferrous minerals and metals, ferro-alloys, crude oil and oil products, fertilizers, petrochemicals, sugar, grains, and other raw materials; refining of precious metals and manufacture of products containing precious metals; mining and processing of nonmetallic minerals, including kaolin, attapulgite, bauxite, and talc.

FLORIDA ROCK INDUSTRIES, INC.

(year ended September 30)

Aggregates—net sales

	In millions
1980	$59.935
1979	48.151
1978	33.759
1977	23.811
1976	16.800

Concrete products—net sales

	In millions
1980	$103.336
1979	88.995
1978	65.224
1977	53.196
1976	51.188
1975	53.419

Net sales by product—% of contributions to net sales

	Ready mixed concrete	Construction aggregates	Other concrete products & building materials
1980	47%	34%	9%
1979	48	33	10
1978	47	30	10
1977	50	26	9
1976	55	20	10

Lines of business: The company has three major segments—construction aggregates, concrete products, and transportation. The construction aggregates segment principally produces and sells sand and crushed stone. The concrete products segment manufactures and markets ready mixed concrete and concrete block and markets other building materials.

GENERAL DYNAMICS CORP.

Material Service and Resources Group—net sales

	In millions	% of total sales
1980	$520	11 %
1979	577	14.2
1978	471	14.7
1977	437	15.1
1976	421	16.5

Lines of business: Military and commercial aircraft; missiles and space systems; commercial ships; building minerals and products; telecommunications and data products, etc.

The building materials and resources group includes these company segments: Material Service Corp. (stone, sand, gravel, ready mixed concrete, concrete pipe); Marblehead Lime Co. (high-calcium lime, dolomitic lime); Freeman United Coal Mining Co.; and Asbestos Corp. Ltd.

GENERAL PORTLAND INC.

Cement & related products—net sales

	In millions	% of total sales
1980	$307.1	98.3%
1979	274.3	99
1978	240.1	97.6
1977	197.6	99.5
1976	180.6	99.8

Net sales by product (percentages are approximate)

	1980	1979	1978
Cement	83%	86%	85%
Ready mixed concrete	7	7	7
Aggregate	7	5	4
Fly ash	1	1	1

General Portland Inc. is one of the nation's largest manufacturers of portland cement, operating a network of nine plants—three in Texas, two in Florida, and one each in California, Ohio, Tennessee, and Kansas. General Portland also markets construction aggregates in Texas and Louisiana, fly ash in Texas, and ready mixed concrete in the Dallas/Fort Worth area. Real estate makes up the remainder of the company's sales—2% in 1980; 1% in 1979; and 3% in 1978.

GENERAL SHALE PRODUCTS CORP.

Net sales

	In millions
1980	$46.170
1979	61.751
1978	66.630
1977	54.120
1976	45.352

Lines of business: Face brick, concrete block, ready mixed concrete, masonry and concrete sand, and burned lightweight aggregate.

GENSTAR LTD.

Cement and lime revenues

	In millions of Canadian dollars	% of total revenues
1980	$360.6	15.6%
1979	182.1	14.4
1978	159.2	13.9
1977	133.6	13.6
1976	127.9	15.6

Concrete, aggregates & construction services—revenues

	In millions of Canadian dollars	% of total revenues
1980	$609.3	26.4%
1979	460.2	36.4
1978	391.2	34.2
1977	383.1	39.1
1976	358.3	43.6

Building supplies—revenues

	In millions of Canadian dollars	% of total revenues
1980	$608.4	26.3%
1979	39.9	3.2
1978	32.1	2.8
1977	21.1	2.2
1976	16.6	2

Lines of business: Cement, lime, ready mixed concrete, concrete block, concrete pipe, sand, gravel, classified aggregates, lightweight aggregates, precast concrete structural and architectural components, precast concrete railway ties, gypsum wallboard, resources recovered from solid waste, and construction asphalt; housing and land development; construction; marine activities; and financial services and investments.

GEORGIA-PACIFIC CORP.

Gypsum—net sales

	In millions	% of total sales
1980	$196	4%
1979	229	4
1978	203	5
1977	160	4
1976	117	4

Lines of business: Building products, including plywood and specialties, lumber, gypsum, roofing, metal products, etc.; pulp, paper, and paperboard; chemical and plastic products; furniture; stationery products; and industrial gypsum, etc.

GIANT PORTLAND & MASONRY CEMENT CO.

Net sales

	In millions
1980	$27.227
1979	30.212
1978	28.284
1977	20.428
1976	18.348

Lines of business: Production of portland and masonry cements at 855,000-tpy plant in South Carolina.

GIFFORD-HILL & CO., INC.

Cement—net sales

	In millions	% of total sales
1980	$201.860	36 %
1979	52.158	12.9
1978	43.280	12.7
1977	32.788	11.2
1976	26.273	9.9

Concrete—net sales

	In millions	% of total sales
1980	$81.951	14.6%
1979	80.178	19.8
1978	72.009	21.2

Aggregates—net sales

	In millions	% of total sales
1980	$45.358	8.1%
1979	40.891	10.1
1978	33.036	9.7

Concrete pipe—net sales

	In millions	% of total sales
1980	$34.725	6.2%
1979	34.041	8.4
1978	33.785	9.9

Lines of business: Cement, sand, gravel, crushed stone, slag, fly ash, ready mixed concrete, concrete pipe, concrete chemicals, asphaltic concrete, metal building products, irrigation products, concrete block, machine tools, transportation.

GULF + WESTERN INDUSTRIES, INC.

(year ended July 31)

Building products—net sales

	In millions	% of total sales
1980	$146	2.74%
1979	136	2.57
1978	108	2.51
1977	89	2.44

Cement—net sales

	In millions	% of total sales
1980	$142	2.66%
1979	148	2.80
1978	140	3.25
1977	123	3.37

Lines of business: Gulf + Western activities are reported in the following business segments: leisure time; consumer and agricultural products; manufacturing; apparel products; automotive replacement parts; natural resources and building products; and financial services. Main products of the Natural Resources and Building Products Group are portland and masonry cement, zinc metal and zinc pigments, titanium dioxide and other chemicals, and metallurgical coal. Cement operations are conducted by G+W's Marquette Co., operating 10 plants in nine states. The building products segment encompasses aggregates and ready mix.

IDEAL BASIC INDUSTRIES, INC.

Cement Division—sales and operating revenues

	In millions	% of total sales & operating revenues
1980	$353.187	77 %
1979	355.351	81.6
1978	349.627	85.3
1977	288.848	83.7
1976	243.365	82

Lines of business: Production of portland cement; mining and concentration of potash.

INDIANA LIMESTONE CO., THE

(year ended November 30)

Net sales

	In millions
1980	$3.727
1979	5.115
1978	5.265
1977	4.063
1976	5.167

Lines of business: The company quarries and fabricates Indiana limestone for use as a building material. By-product stone is sold for breakwater and shoreline protection in the Great Lakes area.

INLAND STEEL CO.

Lines of business: The company has operations in four business segments—integrated steel, steel service centers, steel-related operations, and shelter. Integrated steel operations include the manufacture and sale of steel mill products, and the mining, quarrying, and processing of iron ore, coal, and limestone used in steelmaking. The limestone and dolomite properties of the company are located in the Upper Peninsula of Michigan. A wide range of stone products is produced at the rate of approximately 3.4 million gross tons per year.

INTERPACE CORP.

Concrete pipe—net sales

	In millions	% of total sales
1980	$ 96.8	27%
1979	81.9	25
1978	91.4	31
1977	81.8	44
1976	102.1	52

Lines of business: Construction and building products, including porcelain insulators; pumps; concrete pipe; heating, ventilating, air conditioning, and plumbing products; and structural brick.

IU INTERNATIONAL CORP.

Environmental services—revenues

	In millions	% of total revenues
1980	$181.2	8 %
1979	159.5	7.5
1978	112.7	5.7
1977	90.5	5.2
1976	68	4.5

Lines of business: Reclaims scrap metal from slag; recycles remaining material into construction aggregate; converts pollutants from coal-fired power plants to landfill material; sugar production; other agribusinesses; paper products and food distribution, etc.; pipe fabrication; motor carrier; etc.

JEFFERSON CORP.

(fiscal year ended March 31)

Concrete & adhesive operations—net sales

	In millions	% of net sales	
		Concrete operations	Adhesive operations
1980	$24.44	77.5%	22.5%
1979	19.03	77.5	22.5
1978	16.58	70.4	29.6
1977	17.82	75.4	24.6
1976	21.15	82.9	17.1

Lines of business: Concrete operations (consisting of production of ready mixed concrete, precast/prestressed concrete, sand, gravel); adhesive operations (manufacture, sale, and application of adhesives, coatings, and binders for use in concrete construction); and life and health insurance.

JIM WALTER CORP.

(year ended August 31)

Mineral & fiber products group—sales & revenues

	In millions	% of total revenues
1980	$654.582	33.5%
1979	664.696	34.1
1978	597.128	34.4
1977	510.599	35.5
1976	443.340	34.5

Pipe products group—sales & revenues

	In millions	% of total revenues
1980	$300.559	15.2%
1979	309.005	15.9
1978	299.537	17.3
1977	243.108	16.9
1976	220.423	17.1

Stone products group—sales & revenues

	In millions	% of total revenues
1980	$54.955	2.8%
1979	43.178	2.2
1978	39.300	2.3
1977	36.141	2.5
1976	36.058	2.8

Lines of business: Homebuilding group; mineral and fiber products group (roof shingles, gypsum wallboard, vinyl siding, foam insulation, etc.); pipe products group (concrete, steel and cast iron pipe, valves, and hydrants); coal, iron, and chemicals group; metal and wood products group; stone products group (crushed and dimension stone); paper group; sugar operations; oil and gas operations; and savings and loan operations.

JOHNS-MANVILLE CORP.

Revenues In millions

	1980	1979	1978
fiber glass products	$610.07	$573.19	$514.28
forest products	508.19	497.39	
non-fiber glass insulations	279.44	267.86	231.19
roofing products	249.99	272.67	253.80
pipe products and systems	220.08	304.85	303.33
asbestos fiber	158.94	168.19	157.29
industrial and specialty products and services	340.93	308.39	290.84

Lines of business: Fiberglass products; forest products; pipe products and systems; roofing products; non-fiber glass insulations; asbestos fiber; and industrial and specialty products and services. J-M mines asbestos fiber, diatomaceous earth, and perlite. Perlite is used in industrial roof insulations, asbestos in asbestos-cement pipe, roofing, friction materials, and specialty products; diatomite in filter aids and fillers.

JUSTIN INDUSTRIES, INC.

Building materials—net sales

	In millions	% of total sales
1980	$121.926	62%
1979	131.060	71
1978	127.543	75
1977	105.610	73
1976	64.268	65

Lines of business: Building materials (brick, precast and prestressed concrete, concrete block, lightweight aggregate, and architectural stone); manufacture of boots, belts, and other leather goods; fabrication of ceramic cooling towers; and publishing. Building materials plants are located in Arkansas, Kansas, Kentucky, Louisiana, North Carolina, Oklahoma, Tennessee, and Texas.

KAISER ALUMINUM & CHEMICAL CORP.

Refractories Division—net sales

	In millions	% of total sales
1980	$197.7	6.1%
1979	197.4	6.8
1978	180.3	7.3
1977	152.8	6.8
1976	134.4	7.3

Lines of business: The corporation operates principally in six business segments—aluminum, agricultural chemicals, industrial chemicals, refractories, trading, and real estate. The refractories group includes production of agricultural dolomite; architectural and landscaping dolomite sand and stone; refractory brick and specialties; deadburned dolomite; clay/alumina brick and specialties; fireclay; insulating refractories; magnesium hydroxide; periclase/magnesite; and silica refractories.

KAISER CEMENT CORP.

Cement & clinker—net sales & operating revenue

	In millions	% of total revenues
1980	$214.073	91.62%
1979	238.180	91.76
1978	209.169	91.73
1977	160.751	90.59
1976	139.738	88.41

Concrete aggregates, & other—net sales & operating revenue

1980	$19.590	8.38%
1979	21.397	8.24
1978	18.859	8.27
1977	16.701	9.41
1976	18.312	11.59

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Lines of business: Cement, ready mixed concrete, sand, gravel, crushed rock, coal, and natural gas.

Kaiser's five cement plants in the United States are located in California, Texas, Hawaii, and Montana. Three aggregate plants are located in California, Washington, and Texas. Ready mixed concrete plants are located in Seattle, Wash., Tacoma, Wash., and Austin, Tex.

Abroad, Kaiser Cement purchases cement for resale in certain world markets and engages in limited trading activities. The corporation also has major investments in a cement manufacturing firm in Indonesia and in a firm which is constructing a large cement plant in Hong Kong. Gypsum operations, which were carried on for many years, were discontinued in 1978; in 1979, the company changed its name from Kaiser Cement & Gypsum Corp. to Kaiser Cement Corp.

KEYSTONE PORTLAND CEMENT CO.

Sales, less discounts

	In millions
1980	$20.861
1979	22.436
1978	21.097
1977	16.674
1976	15.737

Lines of business: The company produces portland and masonry cement at its plant in Bath, Pa. Crushed limestone is supplied by an operating division. Another operating division mines bituminous coal for use in fueling the cement kilns.

KOPPERS COMPANY, INC.

Road Materials Group—net sales

	In millions	% of total sales
1980	$531.7	27.6%
1979	454.1	24.8
1978	304.1	19.2
1977	174.1	12.8
1976	134.7	11.3

Lines of business: Organic materials (phthalic anhydride, creosote, alkyd resins, etc.); road materials (sand, gravel, granite, limestone, trap rock, sandstone, slag, ready mixed concrete, bituminous concrete, and steel wire mesh); forest products (lumber); engineered metal products; and engineering and construction.

LAKE ONTARIO CEMENT LTD (CANADA)*

Sales

	In millions
1980	$89.346
1979	88.317
1978	78.364
1977	64.641
1976	54.845

Lines of business: Cement milling and production in Ontario, western New York state, and Michigan; ready mixed concrete, concrete block and brick, and aggregate businesses in Ontario.

LONE STAR INDUSTRIES, INC.

Cement—net sales (domestic)

	In millions	% of total sales
1980	$332.7	36.6%
1979	290	36.6
1978	241.5	37.9
1977	185	40.6
1976	143.4	36.3

Construction aggregates—net sales

	In millions	% of total sales
1980	131.6	14.5%
1979	127.2	16.1
1978	105	16.5
1977	75.8	16.7
1976	71	18

Concrete & concrete products—net sales (domestic)

	In millions	% of total sales
1980	$232	25.5%
1979	201.5	25.4
1978	147.1	23.1
1977	85.2	18.7
1976	71.5	18.1

Lines of business: Cement and related products which include the production and distribution of portland, masonry, and other types of cement, and the manufacture and distribution of ready mixed concrete and concrete products; mining, processing, and distribution of sand, gravel, and crushed stone; real estate operations, wholesale lumber operations, and the sale of other construction materials.

LOUISVILLE CEMENT CO.

Sales, less discounts

	In millions
1980	$76.732
1979	90.022
1978	75.607
1977	70.799
1976	69.747

Lines of business: Louisville Cement Co. is engaged in the manufacture and sale of portland and other types of cement. The company operates three cement plants.

MONOLITH PORTLAND CEMENT CO.

Portland cement—net sales

	In millions	% of total sales
1980	$49.763	86 %
1979	49.962	83.5
1978	32.802	79.8
1977	30.512	82.2
1976	24.920	83.7

Ready mixed concrete, asphalt, and rock aggregates—net sales

	In millions	% of total sales
1980	$8.130	14 %
1979	9.858	16.5
1978	8.291	20.2
1977	6.593	17.8
1976	4.869	16.3

Lines of business: The company produces portland cement, ready mixed concrete, asphalt, rock, and sand. Monolith operates a cement plant in California and one in Wyoming. Ready mixed concrete plants are in California and Wyoming; an asphalt plant and an aggregate plant are in California.

MICHIGAN GENERAL CORP.

Contracting group—net sales

	In millions	% of total sales
1980	$20.3	11.4%
1979	19.7	8.7
1978	19.5	9.7
1977	15.3	8
1976	13	7.6

Architectural concrete products

	% of Contracting Group net sales
1980	69.8%
1979	64.8
1978	64.4
1977	71.4
1976	73.3

Lines of business: Michigan General is comprised of 19 operating entities structured into five operating groups—highway safety; manufacturing; contracting; consumer products; and retailing. The contracting group manufactures concrete pipe, concrete blocks, cribbing for retaining walls, prestressed bridge beams for highway construction, precast and prestressed floor and roof systems, and other structural products. The group also produces architectural precast concrete wall panels, precast/prestressed structural components, concrete masonry units, concrete stave industrial and farm silos, and related products; provides commercial and industrial painting and decorating services; and sells paint, wall coverings, and related items.

**Division of Denison Mines Ltd. (Canada)*

MARTIN MARIETTA CORP.

Cement—net sales

	In millions	% of total sales
1980	$188.4	7.2%
1979	197.7	9.6
1978	181.2	10.3
1977	154.4	10.7
1976	143.7	11.9

Aggregates—net sales

	In millions	% of total sales
1980	$185.2	7.1%
1979	176.9	8.6
1978	157.7	9
1977	130.7	9.1
1976	116.1	9.6

Lines of business: Cement; aggregates; chemicals; aluminum; aerospace; investments. Cement company manufactures and sells portland and masonry cements for use in the construction industry. Aggregates company quarries, processes, and sells crushed stone, sand, and gravel, primarily for highway and general construction, and chemical-grade silica sand for use in the glass and foundry industries. Chemicals company consists of three divisions engaged in the manufacture and sale of concrete admixtures for the construction industry, dyestuff for the textile industry, and refractory materials for the steel industry. Martin Marietta Aluminum is principally engaged in the production of primary aluminum ingot, sold mainly to independent fabricators, and of aluminum mill products, sold principally to distributors and manufacturers in the building and transportation industries. The aerospace company designs, develops, and manufactures aerospace and defense systems, primarily for the U.S. Government.

McDONOUGH CO.*

(year ended January 31)

Building Materials Group—net sales

	In millions	% of total sales
1980	$84.9	18.8%
1979	73.8	17.7
1978	68.6	19.9
1977	55.6	18.2
1976	47.1	16.6

Lines of business: McDonough is a multi-product line company operating in three basic industries—building materials, footwear, and hand tools. The building materials group consists of the Gulf Coast Portland Cement and the Houston Shell & Concrete Divisions which produce cement and ready mixed concrete for the metropolitan Houston market; the Ohio River Division produces and markets sand and gravel in central Ohio and West Virginia.

Acquired by Hanson Industries, Inc., London, England, Jan. 30, 1981.

MEDUSA CORP.

(Subsidiary of Crane Co.)

Construction materials—net sales

	In millions	% of total sales
1980	$190.665	88.9%
1979	252.336	88.6
1978	244.	84.9
1977	216.755	89.8

Lines of business: The company has two major business segments—construction materials and construction services. The construction materials segment principally includes production and sale of cement products, stone, sand, gravel, and asphalt. The construction services segment includes highway safety construction and asphalt paving.

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MOORE MCCORMACK RESOURCES, INC.

Cement, concrete products and aggregates—sales and revenues

	In millions	% of total sales
1980	$142.4	22.2%
1979	64.9	14.1

Lines of business: Iron ore, coal, cement, concrete products, aggregates, oil and gas, bulk transportation, cargo liners. The cement, aggregates, and concrete products segment includes the production of ready mixed concrete, concrete block, portland cement, aggregates, and prestressed and architectural concrete structures.

NATIONAL GYPSUM CO.

Gypsum & related products—net sales

	In millions	% of total sales
1980	$353	42.3%
1979	391	38.4
1978	342	37.6
1977	267	35.7
1976	210	34.2
1975	171	32

Cement—net sales

	In millions	% of total sales
1980	N.A.*	—
1979	$164	16.1%
1978	145	15.9
1977	114	15.2
1976	97	15.8
1975	93	17.4

Lines of business: Gypsum and related products; wall and floor coverings; glass and metal products; specialty and other products such as tiles, exterior siding, lime, limestone, and manufactured housing.

**Negotiations for sale of the company's Cement Division to the General Dynamics Corp. were terminated. According to the 1980 Annual Report, National Gypsum is taking steps to find an alternative buyer.*

NORTHWESTERN STATES PORTLAND CEMENT CO.

(year ended November 30)

Net sales	In millions
1980	$37.002
1979	40.696
1978	43.097
1977	35.477
1976	29.959

Lines of business: The company manufactures cement in its plant in Mason City, Iowa, and markets the product in an area encompassing parts of the states of Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin.

OGLEBAY NORTON CO.

Minerals operations—sales and revenues

	In millions	% of total revenues
1980	$23.517	13 %
1979	19.451	10
1978	15.270	9.3
1977	13.653	11.9
1976	10.146	8.7

Lines of business: Operations covers minerals, transportation, and manufacturing. The company is engaged in the production of iron ore, coal quartzite, silica sand, refractory and insulation materials, ferrous and nonferrous products. Quartzite is produced by its Central Silica Co. subsidiary in two plants in Ohio. Fracture sand for oil and gas well treatment is processed in Texas by its subsidiary, Texas Mining Co. Silica flour is made at Texas and California locations. The minerals operations segment covers quartzite sand and fracture sand production, oil and gas production, and fluorspar briquette manufacture.

OREGON PORTLAND CEMENT CO.

Net sales	In millions
1980	$55.075
1979	52.592
1978	45.600
1977	37.089
1976	33.569

Lines of business: The company operates three cement plants, two in Oregon and one in Idaho, and also is a producer of agricultural and chemical limestone products. Products are marketed in Oregon, Idaho, and Washington, and in parts of Utah, Nevada, Wyoming, and Montana.

PENN VIRGINIA CORP.

Industrial minerals—operating revenue

	In millions	% of total revenue
1980	$9.438	17.4%
1979	9.552	17.8
1978	9.376	23.7
1977	8.724	24.1
1976	6.894	24.2

Lines of business: Production of cement, lime, and crushed limestone; fly ash pozzolan marketing; coal land operations; oil and gas development; equipment manufacturing; investments.

H. K. PORTER CO., INC.

Cement—net sales

	In millions	% of total sales
1980	$62.922	9.6%
1979	82.964	12.9
1978	75.497	13.8
1977	39.415	8.2

Lines of business: The company operates in six principal areas—industrial products, electrical products, industrial distribution, steel, specialty metals, and cement. The cement segment started with the acquisition, in 1977, of Missouri Portland Cement Co.

PUERTO RICAN CEMENT CO., INC.

Cement and related products—net sales

	In millions	% of total sales
1980	$72.865	93.2%
1979	57.104	90.2
1978	57.804	95.5
1977	54.016	93
1976	53.448	95.4

Lines of business: Cement and related products including portland cement and hydrated lime; multiwall paper bag manufacture; and real estate development.

ST. LAWRENCE CEMENT CO. (Canada)

Cement—net sales

	In millions	% of total sales
1980	$109	47%
1979	139	54
1978	114	49
1977	85	43
1976	62	39

Stone & building materials—net sales

	In millions	% of total sales
1980	$52	22%
1979	52	20
1978	42	18
1977	43	22
1976	39	24

Ready mixed concrete—net sales

	In millions	% of total sales
1980	$51	22%
1979	48	19
1978	43	19
1977	47	24
1976	47	30

Lines of business: Operation of cement plants, stone quarries, sand and gravel pits, ready mixed concrete plants, concrete block plants, prestressed concrete plants, concrete pipe plants, building materials centers, fuel oil and lumber distribution centers, and asphalt plants. These activities are conducted in Quebec, Ontario, and New York.

Outlook for 1985*

Total value of construction put in place in 1985 should be $390 billion to $420 billion. This assumes annual inflation of construction costs of about 8% and a real increase in annual construction demand of 3 to 4% between 1980 and 1985. This also assumes that Congress will find the necessary funds to finance the repairs and additions needed for highways and other public construction projects. There is an increasing interest in providing more incentives for capital formation and improved productivity in the private sector, which could benefit the construction industry.

Housing markets in the decade of the 1980s are expected to benefit from a strong demand for owner-occupied units as a result of rising incomes, inflation, and the maturation of babies born following World War II. The number of households in the United States showed an average annual increase of 1.2 million between 1965 and 1970; 1.5 million between 1970 and 1975; and 1.6 million between 1975 and 1980. Estimates of the average annual increase in the number of households prepared by the Bureau of the Census range from a low of 1.3 million to a high of 2.1 million for 1980-1985 then drop to the 1.0 million to 1.8 million range for the 1985 to 1990 period. This increase in the rate of new household formations will add to the demand for housing throughout the 1980s especially for the first part of the decade. This demand will be filled from a combination of newly constructed units, mobile homes, and units converted from the existing housing stock and nonresidential structures. Other studies show a strong and growing preference for detached single-family houses.

Based on demographics and other data, conventional housing starts could reach 2.1 million units in 1985, including 1.4 million (67%) single-family units and 700,000 (33%) multifamily units. In addition, estimates show that 350,000 mobile home units could be built.

**Source: 1981 U.S. Industrial Outlook for 200 Industries with Projections for 1985, U.S. Dept. of Commerce, January 1981*

SOUTHDOWN, INC.

Cement—revenues

	In millions	% of total revenues
1980	$181.476	74.6%
1979	172.650	79.4
1978	144.714	63.3
1977	124.362	64.6
1976	99.078	55.4

Lines of business: Oil and gas production and cement manufacture. Southwestern Portland Cement Co., Southdown's cement subsidiary, operates plants in California, Ohio, and Texas.

STANDARD INDUSTRIES, INC. (Canada)

(year ended March 31)

Net sales

	In millions
1980	$122.592
1979	100.388
1978	93.982
1977	84.079
1976	74.854

Lines of business: Sand, gravel, crushed stone, slag cement, ready mixed concrete, concrete pipe, concrete block, asphaltic concrete, highway paving.

TEXAS INDUSTRIES, INC.

(year ended May 31)

Concrete products—sales & revenues

	In millions	% of total revenues
1980	$257.8	91.2%
1979	208.6	92.9
1978	177.2	93.4
1977	142.1	93.6
1976	127.4	91.2

Lines of business: Concrete products segment includes cement, aggregates, ready-mix, concrete block and brick, concrete pipe, prestressed concrete products, and architectural precast panels. The construction operations segment includes highway construction contracting, hot-mix asphalt paving, masonry contracting, and concrete contracting.

UNITED STATES GYPSUM CO.

Gypsum products—net sales

	In millions	% of total sales
1980	$643.261	43.6%
1979	701.237	46
1978	623.730	44.6
1977	480.475	40.8
1976	363.753	37.8

Lines of business: Industry segment sales by the company in 1980 were: gypsum products, 44%; refractories, 17%; metal products, 12%; wood fiber and mineral fiber, 10%; other products, 17%.

VULCAN MATERIALS CO.

Construction materials—net sales

	In millions	% of total sales
1980	$314.378	41.7%
1979	316.982	42.4
1978	291.746	44.7
1977	229.130	44.8
1976	181.847	44.2

Lines of business: Vulcan Materials is a multi-industry company operating in three basic businesses—construction aggregates production; chemicals manufacture, including chlorinated hydrocarbons and other industrial and agricultural chemicals; and production of secondary aluminum, detinned steel scrap, and tin chemicals.

In 1980, the Construction Materials group operated 90 facilities in 12 states for the production of crushed aggregates. These aggregates consist of crushed stone (granite and limestone), slag, sand and gravel, expanded lightweight shale, dolomitic lime, and mineral filler. Crushed stone was produced at 80 plants.

The company also operates three sand and gravel plants, four slag plants, a lime plant, an expanded lightweight shale plant, a mineral filler plant, and a pulverized limestone plant. Other products and services include ready mixed concrete and asphaltic concrete manufacture, truck sales and service, and miscellaneous materials processing activities.

WHITEHALL CEMENT MANUFACTURING CO.

Sales, less discounts

	In millions
1980	$21.531
1979	20.362
1978	21.286
1977	14.852
1976	14.235

Lines of business: The company is engaged in the production and sale of portland cement. Plant and office are located in Whitehall, Pa. ●

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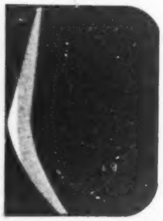
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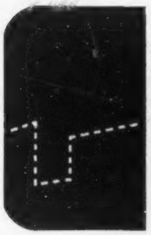
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A breakthrough in crusher performance analysis, and a new grinding technology are reported in Focus features.

ON THIS MONTH'S COVER

The symbolic return of a drop of fuel to the nozzle is equivalent to saving that drop, the prime discussion point of Focus features in this issue. (Staff art)

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MEMBER

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COMPARISON OF 1981/1980 CONSTRUCTION CONTRACT VALUES*

	1981 5 Mos.	1980 5 Mos.	Cumulative % Change
Nonresidential Building	$23,574.3	$19,964.5	+18
Residential Building	26,847.9	21,625.1	+24
Nonbuilding Construction	11,696.0	12,857.9	− 9
Total Construction	$62,118.2	$54,447.5	+14

DODGE INDEX
(1972 = 100, seasonally adjusted)
March, 1981 .... 183 April, 1981 .... 172 May, 1981 160

**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Noise Control Workshops For Mobile Equipment Personnel

Mine operators, shop foremen, safety personnel, or others responsible for mobile equipment noise control are being invited to take part in a series of free workshops. The U.S. Bureau of Mines is sponsoring the workshops, "Retrofit Noise Control of Front-End Loaders," to be held this fall in five states. This series is a follow-up to the Bureau's Bulldozer Noise Control workshops which were well received last year.

The fall workshop series will be held the following dates and locations: September 29—Washington, Pa.; October 2—Louisville, Ky.; October 7—Duluth, Minn.; October 14—Denver, Colo.; and October 29—Seattle, Wash.

Engineers from Bolt Beranek and Newman Inc., the firm that conducted the loader noise control research under contract to the Bureau of Mines, will present the workshops. Topics to be discussed include the basics of noise control and measurement, which apply to all mobile equipment, and specific treatment fabrication and installation for front-end loaders. Examples of noise control materials and hardware will be displayed.

To reserve a place at the workshop nearest your operation and obtain more information on workshop locations contact: Carol Prybylo, Bolt Beranek and Newman Inc., 50 Moulton St., Cambridge, Mass. 02238.

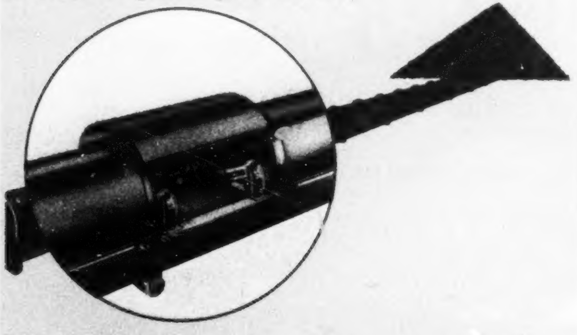
Correction

In the June 1981 issue of P&Q we published a news item stating that Polysius Corp., Atlanta, Ga., had been awarded a contract for $1 million by the Suez Cement Co. The contract, for a 1.4-million-mtpy cement plant, was in excess of $100 million.

ASLA/NCSA Announce Winners Of 1981 Student Competition

Students in landscape architecture programs at Michigan State University, and the University of North Carolina received top prizes in the sixth annual American Society of Landscape Architecture/National Crushed Stone

Shelter your profits!



New S-A belt conveyor hoods give all-weather protection to materials, belts, idlers!

• Reduce costly material loss from wind and rain . . . protect belts, idler rollers from sun-drying and freeze-ups. • 4' cover sections are quick opening, easily installed. • Simple design—cover sections supported on bends that bolt directly to foot brackets. • Rugged construction—cover sections and supporting hardware are of heavy-gauge galvanized steel. Bolts, nuts, washers are cadmium-plated. • Available from stock in 24", 30", and 36" belt sizes. For more information, write or call Stephens-Adamson, Inc., Aurora, Ill. 60507. (312) 892-4311.

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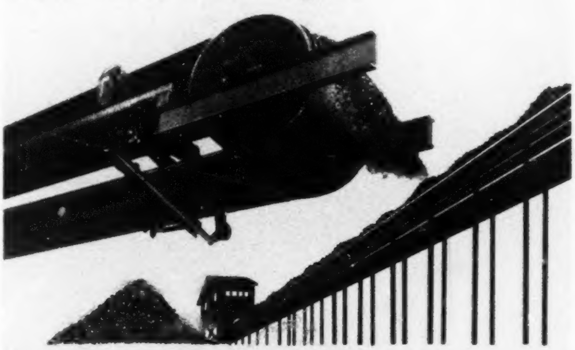
Clean belts last longer!



S-A spring-type cleaners protect costly conveyor belts with the simplest, most effective cleaning action!

• Cleans completely—overlapping blades on spring arm seat uniformly on belt surface; completely remove wet, dry or sticky materials from belt. • No moving parts—requires no drive of any kind. • Won't injure belts or catch on belt surfaces. • Prevents materials from being ground into belt. • Easy to install and operate. • Adjustable to fit any size conveyor frame. For more information, write or call Stephens-Adamson, Inc., Aurora, Ill. 60507. (312) 892-4311.

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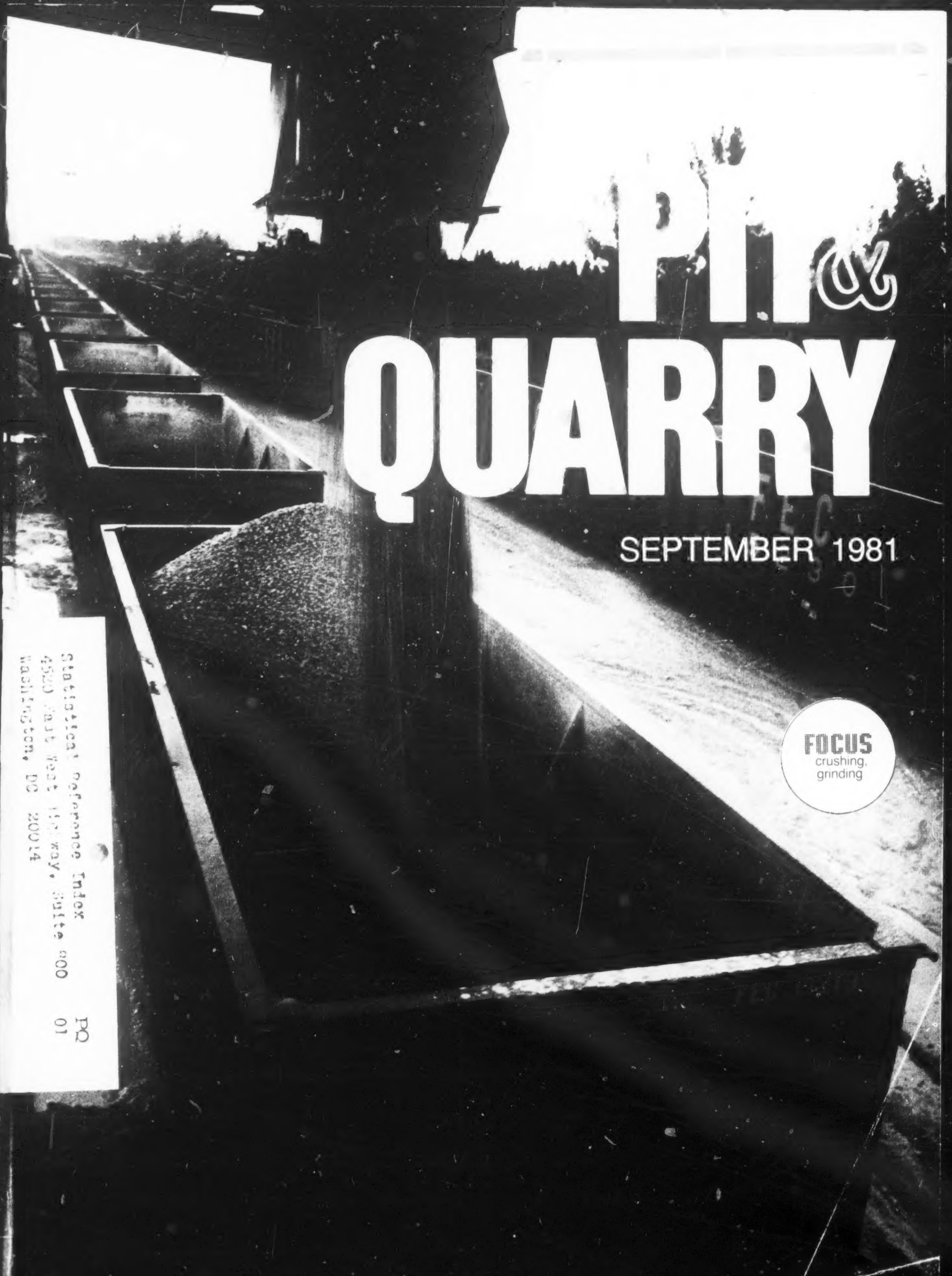

PIT & QUARRY

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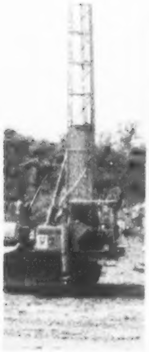

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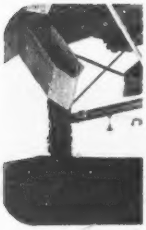

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AND NEXT MONTH

Major features discuss maintenance factors from metal wear to kiln refactories.

ON THIS MONTH'S COVER

Dedicated trains of rapid discharge equipment boost shipping efficiency for aggregate producers around the country. Page 66.

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COMPARISON OF 1981/1980 CONSTRUCTION CONTRACT VALUES*

	1981 6 Mos.	1980 6 Mos.	Cumulative % Change
Nonresidential Building	$28,853.5	$24,963.6	+16
Residential Building	32,704.6	26,895.1	+22
Nonbuilding Construction	15,106.9	15,680.1	−4
Total Construction	$76,665.0	$67,538.8	+14

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(1972 = 100, seasonally adjusted)
April, 1981 .... 172 May, 1981 .... 160 June, 1981 170

**Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems Co.*

Ohio State University Reactivates Mining Engineering

Ohio State University has reactivated its master of science degree in mining engineering with courses to start this fall. The program will include specialty areas in explosives, surface mine equipment use, coal and mineral preparation, mining management, and strata control.

Ohio State also is the site of the state's only federally funded Mining and Mineral Resources Research Institute—one of the original such institutes in the nation.

ARPA Honors Ronstadt

Karl G. Ronstadt, president and chairman of the board of New Pueblo Constructors, Inc., recently was presented an award of merit upon his retirement from 6 years of service with the Arizona Rock Products Association. Ronstadt, also a former president and board member of the Arizona Chapter of the Associated General Contractors, was recognized for outstanding and worthy contributions for his years of service as an officer and member of the ARPA.

Swedish Blasting Technique For Populated Areas

A new blasting technique which allows rock blasting to be carried out in close proximity to buildings without risk of structural damage has been developed by Skanska Cementgjuteriet (Skanska), Sweden's leading contractors, according to the construction magazine *Byggindustrin.*

Called "slot drilling," the method provides for a number of equally spaced holes to be drilled by means of specially designed drilling equipment. This creates a slot in the rock through which blasting vibrations cannot pass. Slots can be drilled flush with house foundations and blasting can proceed without hazard.

The slot drilling system allows blasting near buildings with charges that are 10 times stronger than normal, it is stated, while blasting costs are nearly halved. Other advantages include improved rock stability, reduced need for reinforcement, increased safety, and smoother post-blasting surfaces.

UTLX hopper cars are backed

Six models from 3000 to 5820 cu. ft. You're looking at a new breed of hopper cars from a well-known name in rail car building—Union Tank Car.

Six UTLX hopper car models are now available, each designed for grain, salt, sand, plastic pellet or general commodity service. In 3000, 3500, 4000, 4750, 5250 and 5820 cu. ft. capacities.

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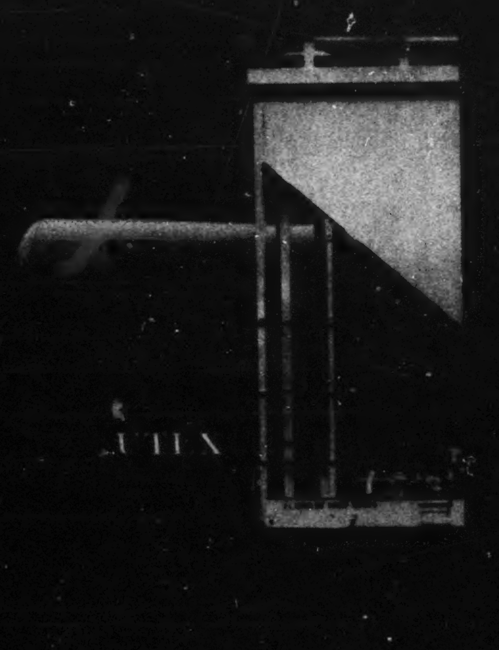

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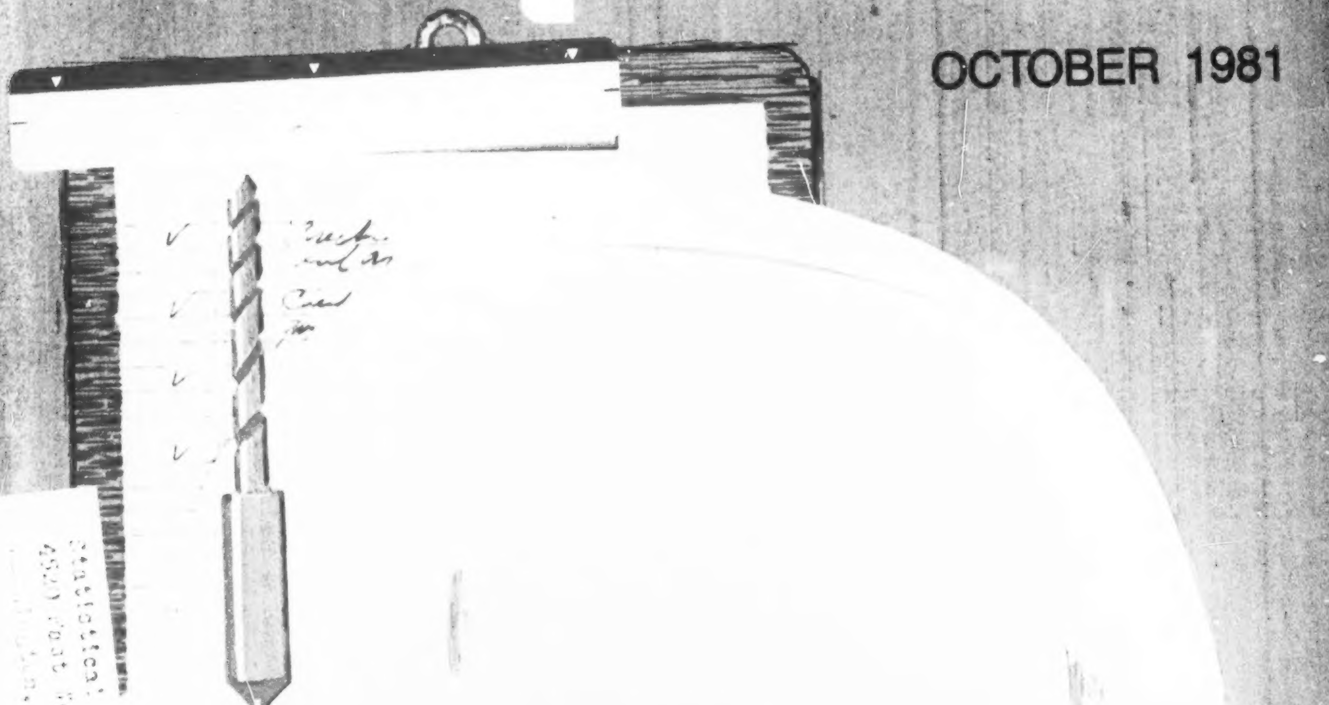

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MAINTENANCE ISSUE

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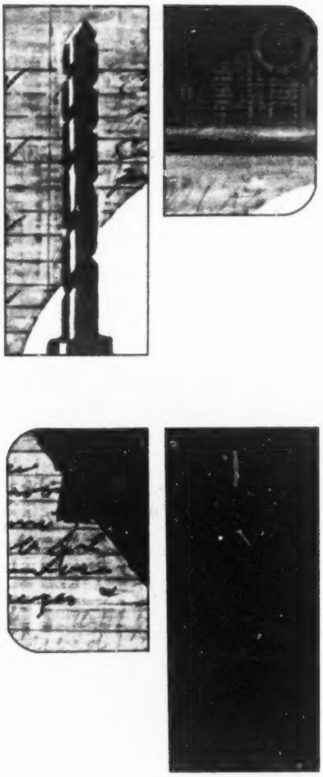

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AND NEXT MONTH

Screen efficiency, size and a drive component will be discussed in Focus features

ON THIS MONTH'S COVER

Maintenance planning, procedures and supportive products are subjects of feature reports in this issue. Cover by Janet Wilcox.

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Paris Site for International Lime Association Congress

Paris, France will be the site for the 5th International Lime Association Congress on July 1-2, 1982. The 1982 Congress will cover: energy problems, environmental protection, and developments in lime utilization. In addition, program activities will include tours of lime, steel, and atomic facilities; sightseeing in Paris; and a reception and dinner at the Palace of Versailles.

Information on the International Lime Association Congress can be obtained from National Lime Assn., 3601 North Fairfax Dr., Arlington, Va. 22201.

U.K. Encourages Industry To Conserve Energy

The aim of the United Kingdom Government's Energy Conservation Demonstration Projects Scheme is to encourage the widespread adoption of energy conservation technologies by demonstrating their technical and economic effectiveness in operation. Grants of up to 25% are available for energy-saving plants.

The largest such project to date involves almost £ million of government funding to help the Rugby Portland Cement Co. Ltd. convert a 530-mtpd wet cement kiln at its Southam Works, Warwickshire, to operate as a semi-wet plant. When completed in early 1982, the specific fuel consumption of this kiln will be reduced by 35%—from 1,650 to 1,050 kg of product—and its capacity raised by 30%.

Conversion to the semi-wet process is particularly attractive because the kiln requires no major modifications; only the removal of chains and the incorporation of some additional refractories, which can be carried out with a minimum of downtime. The projected 30% increase in kiln capacity results from the greatly reduced evaporative duty required of the kiln.

At Rugby Portland, the increased throughput of the converted kiln may enable the company to shut down an old thermally inefficient wet kiln which requires considerable maintenance. This would be a cost-saving bonus.

Engineering consultants, WS

COMPARISON OF 1981/1980 CONSTRUCTION CONTRACT VALUES*

	1981 7 Mos.	1980 7 Mos.	Cumulative % Change
Nonresidential Building	$34,267.8	$29,760.5	+15
Residential Building	38,580.7	33,088.1	+17
Nonbuilding Construction	17,899.5	18,184.0	− 2
Total Construction	$90,748.0	$81,032.6	+12

DODGE INDEX
(1972 = 100, seasonally adjusted)

May, 1981 .... 160 June, 1981 .... 170 July, 1981 153

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